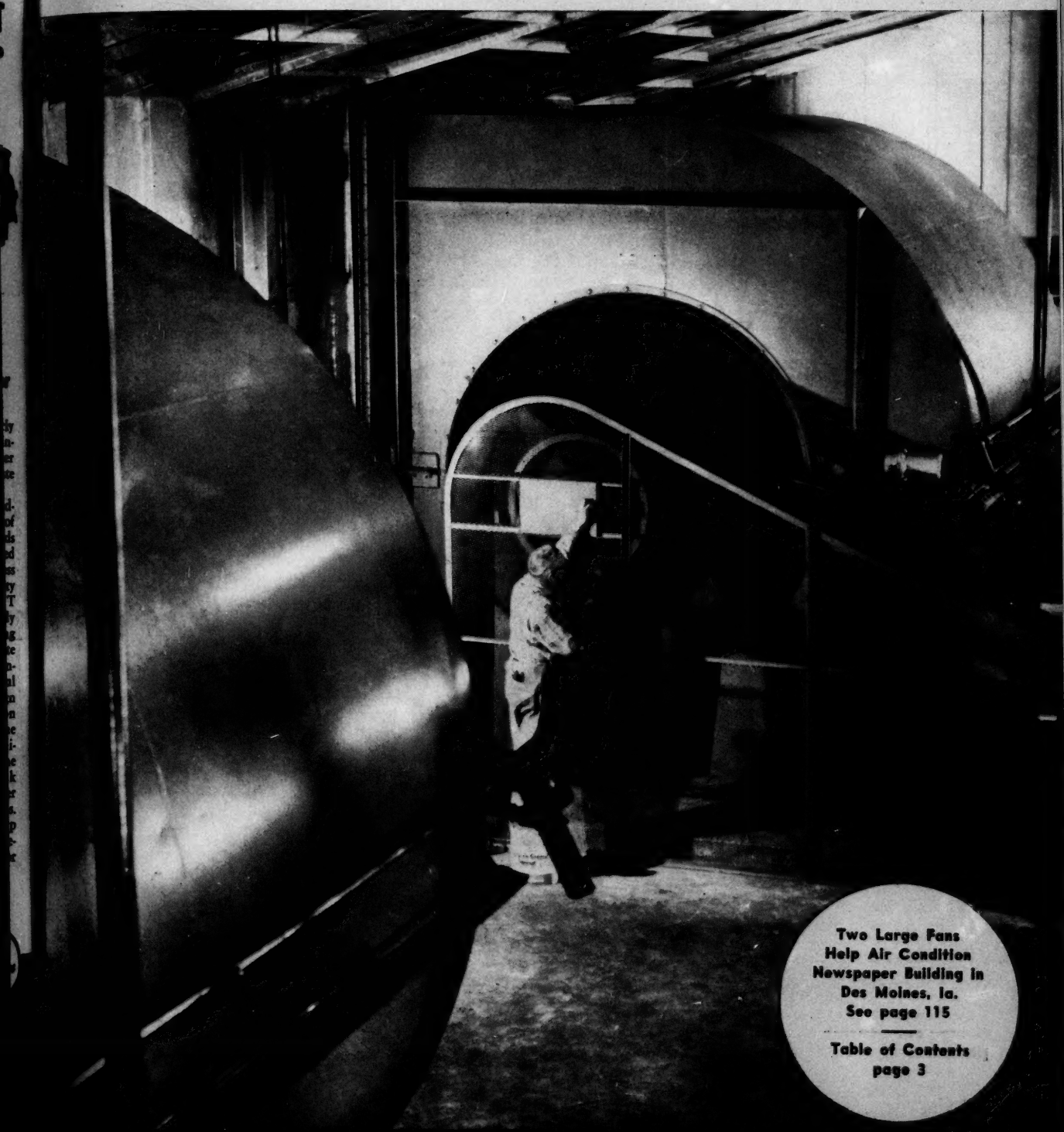
AIR CONDITIONING HEATING AND VENTILATING

JUNE, 1957—54th Year



Two Large Fans Help Air Condition Newspaper Building in Des Moines, Ia.
See page 115

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One of a series.

Some Things to Think About Steam Traps

...in order to get high operating efficiency and a minimum of maintenance

The gentleman who invented the wheel had a basic idea and so far no one has come up with anything better for the purpose.

If you'll pardon us for a little overemphasis on the significance of steam traps, we'd like to liken one of them to the wheel.

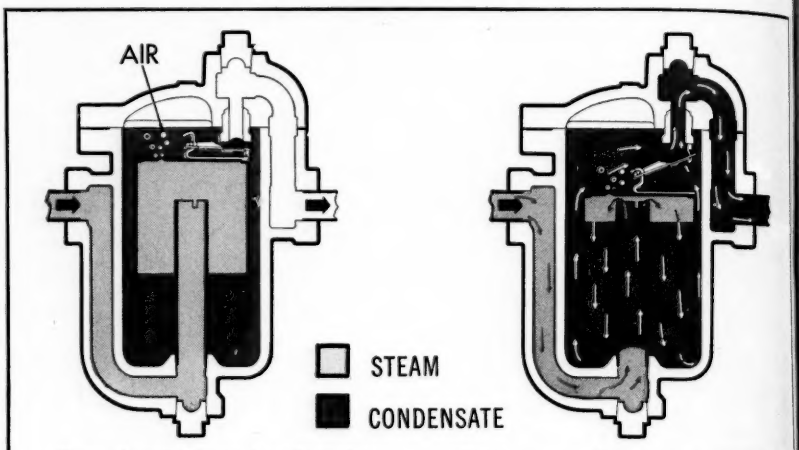
In 1911, when the first Armstrong inverted bucket steam trap model was announced to the world, or at least that part of the world that modest advertising and sales budgets would cover, it was not received with equal enthusiasm by all (especially old-style trap makers). But, like the wheel, it managed to find its way into general use. And, nothing better has ever turned up for the purpose of draining condensate. As a matter of fact, the Armstrong trap has been very widely copied. Today, there are more inverted bucket traps draining process equipment than any other kind. Of these, there are more Armstrongs.

If this sounds like the boasting of a proud parent, give consideration to some fundamental requirements not met by all traps:

1. ***A steam trap should not leak steam.*** Some traps do, you know, because of the nature of their operating principle. No steam ever gets to the Armstrong trap orifice. The valve is always water sealed.

2. ***A steam trap should vent "air" as fast as it accumulates***—otherwise temperatures are reduced and corrosion is a problem. The Armstrong trap handles air very nicely. The vent in the bucket permits air to accumulate in the top of the trap, from where it is discharged when the trap opens. For extreme conditions like draining paper machine dryers, some jacketed kettles and certain other units, the vent is sized larger for the job. And, for handling big volumes of air during warm-up, a bucket with an auxiliary thermic vent really speeds up heating.

3. ***A steam trap should discharge condensate at steam temperature*** if you want to get maximum efficiency from the unit drained. And most people certainly do. If you have to wait for the condensate to cool, it's almost impossible to maintain maximum temperatures and prevent air build-up. You guessed it—the Armstrong trap opens for water, without dependence on temperature.



Trap closed. Steam has floated inverted bucket; valve is held tightly closed by system pressure. Air entering trap passes through bucket vent and accumulates at top of trap.

Trap open. Condensate entering trap has caused bucket to lose buoyancy. Weight of bucket times leverage pulls valve open. Air is discharged along with condensate.

4. ***A steam trap should be suitable for any return system.*** The Armstrong trap works just the same whether discharging to atmosphere, back pressure or vacuum. It has been conclusively proved that flash steam resulting from use of a bucket trap does not cause a problem in vacuum return systems. The flash condenses rapidly. It's the leaky traps that cause the headaches.

5. ***A steam trap should not be a "prima donna".*** Some kinds of traps take an awful lot of care and coddling. The Armstrong trap is a rough and ready type with a hardened chrome steel constitution (valve and seat, to be exact). It cleans itself of ordinary dirt and scale without choking up. Its 18-8 stainless parts stave off rust and corrosion. It resists wire-drawing and wear remarkably well. In fact, it stays on the job longer with less attention than any trap ever produced. Unless you live in Siberia, you can probably find a user around the corner who will tell you so from experience.

6. ***A trap should not be an "orphan".*** With Armstrong traps you can *always* get prompt service and parts from nearby Factory Representatives and stocking distributors as well as from the factory.

7. ***A trap should have a guarantee.*** The Armstrong trap is unconditionally guaranteed to give you *complete satisfaction* (as to doing its job, that is). If it doesn't, you can get your money back.

If you'd like to buy some of these excellent steam traps, call your local Armstrong Representative or write **Armstrong Machine Works, 8464 Maple St., Three Rivers, Michigan.**

ASK FOR the 44-page Steam Trap Book, free on request without obligation.

ARMSTRONG STEAM TRAPS

At last, authoritative research shows the way to

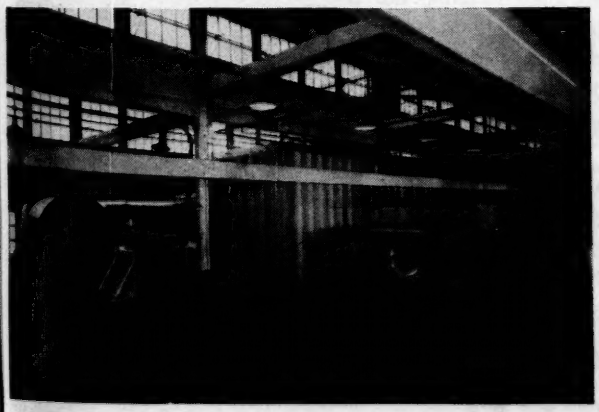
Predict and Reduce Fan Noise!

DeBothezat now offers this new 50 page book on noise control . . . anyone can use it to predict and reduce ventilating fan noise in every installation.

YOU NEED this new book, "Controlling Ventilation Noises," if you ever have *anything* to do with specifying or installing fans. This book simplifies the unfamiliar, specialized terminology of the acoustical engineer — as well as the methods for solving noise problems — so that the entire data can be put to practical use in the plant. It covers installations indoors as well as outdoors.

This data is entirely new. Nothing like it has ever before been available to the industry. The book is a result of noise control research recently completed by the acoustics staff of the Armour Research Foundation of Illinois Institute of Technology.

DeBothezat Centrifugal Roof Ventilator undergoing standard noise source calibration tests at Armour Research Foundation's acoustical laboratories.



Exterior view air outlet end of DeBothezat noise evaluation reverberation test rooms. Mock-up engine cooling test equipment in the foreground.

To supplement the research performed at Armour Research Foundation, which was sponsored by the DeBothezat Fans Division, DeBothezat has constructed its own noise-evaluation laboratories. These include reverberation rooms designed and calibrated for DeBothezat by Armour.

The entire noise evaluation project was sponsored by DeBothezat as a contribution to industry. It was accomplished at a cost of over $20,000 including the research at Armour and the facilities installed in DeBothezat's laboratories.

DeBothezat's facilities are now being used (1) to *obtain* accurate sound-output data on fan units, (2) to *develop* new fans with lower noise levels, and (3) to allow *publishing* of reliable sound-output data. In fact, DeBothezat fans are now rated for noise on both the inlet and outlet sides. These ratings are expressed in decibels and give the average sound pressure levels in each of 8 octave bands of frequencies, measured separately. This information is available on *all* DeBothezat fan units. They are the only fan units in the industry so rated.

The helpful 50-page book "Controlling Ventilation Noises," is available for just $2.00 prepaid to help defray costs of printing and handling. With it, anyone can predict and reduce ventilating fan noise in every installation. Request your copy on your business letterhead and attach check or two one-dollar bills.

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A DIVISION OF
American Machine and Metals, Inc.
Dept. HV-657, EAST MOLINE, ILLINOIS

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THE *Riviera*

Webster's Finest Product . . . the Warren Webster Man

WARREN WEBSTER

HEATING . . . COOLING

AIR CONDITIONING HEATING AND VENTILATING

JUNE, 1957

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The Cover: Fans installed in the Register and Tribune Building, Des Moines, Ia., to serve an air conditioning system.

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HIGH SPOTS

• The important word **simultaneously** has been added to the **official definition of Air Conditioning** adopted by the American Society of Heating and Air-Conditioning Engineers. The new definition recommended by the Society is as follows: "Air Conditioning is the process of treating air so as to control **simultaneously** its temperature, humidity, cleanliness and distribution to meet the requirements of the conditioned space."

• **Installed cost of central air-conditioning systems** which went into operation in large office buildings, stores and similar applications in the United States during 1956 is estimated at $556,670,000, it is reported by the Air-Conditioning and Refrigerating Institute. Installed value of systems put in operation has increased each year, with the exception of 1952, since 1950 when the figure was reported to ARI as $241,770,000. Actual cost of compressors, condensing units, absorption and adsorption systems, and centrifugal systems of 25 horsepower and over (sizes covered by the above figures) is estimated at about 10 per cent of the installed value of central station systems. The remainder includes labor, ducts, controls, insulation, plumbing, and all other installation costs.

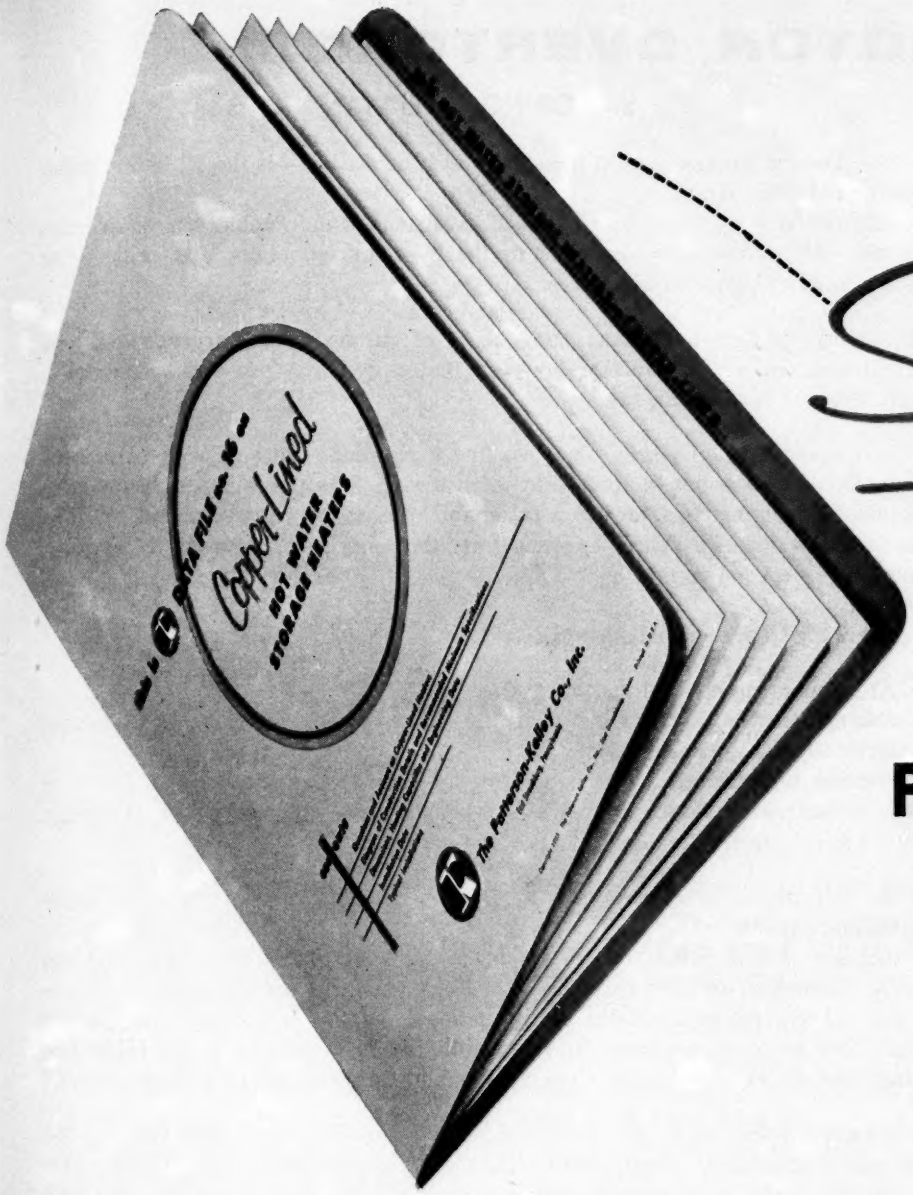
• Third edition of the **IBR Testing and Rating Code for Baseboard Radiation** has been published by The Institute of Boiler and Radiator Manufacturers. The new edition includes a provision for check testing at the recently completed IBR laboratory in Urbana, Ill.

• Colby College, Waterville, Maine, will offer a **course in Industrial Safety** from August 26-31, 1957. An outstanding faculty in the field of industrial safety will conduct the program. A brochure outlining the course, listing the teaching staff, and supplying other information is available from the college.

• The nation's private insurance industry has made available more than **$100 million of atomic energy insurance** and is already writing such policies, it was reported to an American Management Association conference recently. The Nuclear Energy Property Insurance Association, made up of 185 capital stock insurance companies, is providing coverage on a chemical processing plant in Missouri, and is reviewing the details of 22 other operations involving nuclear hazards.

• Details of the **1957 International Solar House Architectural Competition** have been announced in a 16-page program, published by the Association for Applied Solar Energy. Architects licensed to practice in their home states or nations, and students, designers, or engineers who are affiliated with registered architects are eligible to enter the competition. First prize will be a cash award of $2500 and the architectural contract for the building of the residence, which will be erected shortly after selection of the winner on September 15, 1957. The site is in Sundown Ranch Estates, located in Paradise Valley, northeast of Phoenix, Arizona.

• **The Patent Office is in need of engineers and scientists** to serve as Patent Examiners, according to The New York Patent Law Association. The Association reports that while delays in the processing of patent applications in the Patent Office have been somewhat reduced during the past year, it still takes about ten months before a new patent application is first examined, and an average of 3½ years before a patent is issued. These delays create uncertainty as to the patent status of new products and processes and tend to slow down or defer their adoption by industry and introduction to the public.



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WASHINGTON OVERTONES

by LORING OVERMAN

The Federal Budget—could it and should it be slashed—is the 72 billion dollar question in Washington.

Its overtones are being heard from Capitol Hill to the Pentagon; from electors to elected; from wistful taxpayers to the "yes-but" suppliers who provide the government with goods and services.

● Among the "yes-but" group, the theory of cutting federal expenditures (and taxes) is intriguing. In practice, however, budget cuts may prove more painful to them than the burdensome tax.

Consequently, members of Congress find it puzzling (and amusing) to find that John Doe Voter writes on both sides of his paper. As president of the Doeville chamber of commerce, John writes in support of economy in government. Writing on the other side of the sheet as president of the John Doe Construction Company, John urges special funds for schools, hospitals, public housing and other local projects.

Hence the Congressional dilemma.

● At the moment, how is John Doe faring?

"No tax cut this year" is the Administration viewpoint. "Let there be a balanced budget this year; a tax cut in 1958."

Pointing out that next year is an election year, Democrats seem to feel it to their advantage to trim the Administration budget now, and to vote an immediate tax cut as evidence of Democratic acumen.

● Administration view, as voiced by Budget Director Percival F. Brundage, is something like this:

Increase of $7.2 billion, or 11 percent, in the federal budget between 1955 and 1958, "represents in large part the effect of increases of about 5 percent in population, 21 percent in the value of the national output, 7 *percent in the cost of goods and services purchased,* and something over 10 percent in pay raises and fringe benefits enacted by the Congress for both military and civilian personnel."

● Principal overtone of the budget-slashing controversy is a **new role for the Senate.** Traditionally, Senate restores to the President's budget many of the cuts voted by the House. Currently, Senate committees are accepting House cuts, and doing additional pruning. This pattern holds where direct expenditures are involved. Where loans or similar authorizations pass the financing along to others, Senate committees seem quite willing to give approval.

Case in point is the **aid-to-education** bill.

● Apparently sensing the economy trend, House Education and Labor Committee has voted to reduce to $1.5 billion (from $2 billion), its proposals for a five-year program of federal aid to school construction.

● Some on the committee favored a $600 million program annually for the next six years.

● The cut-back version also proposes $750 million in federal funds for direct purchase of school construction bonds in areas where they cannot be marketed locally.

● In considering House-approved **omnibus housing bill,** the Senate Banking Committee took the following actions:

Voted down its own sub-committee proposal for 135,000 public housing units to be constructed yearly for two years. House-passed bill made no provision for

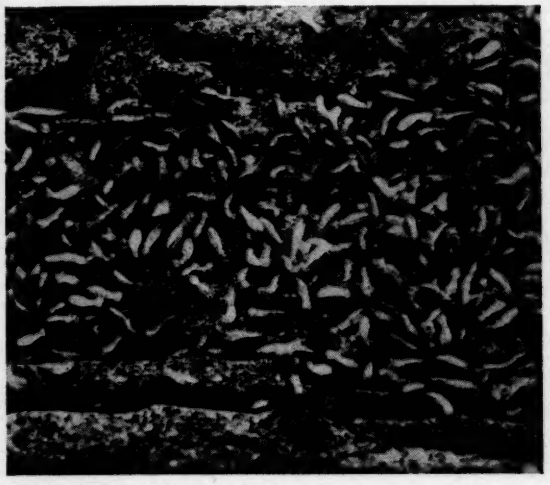
(Concluded on page 8)

BULLETIN No. 1993

"Decay and Termite Damage in Houses"

Worker Termite
Greatly enlarged

Prepared by the DIVISION OF FOREST INSECT INVESTIGATIONS, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration; and the DIVISION OF FOREST PATHOLOGY, Bureau of Plant Industry, Soils, and Agricultural Engineering.



Worker Termites—Natural size

(Excerpts—Exact Quotation)

"TERMITES are the most destructive of the insects that attack wood in houses. They eat the interior of the wood and may cause much damage before they are detected."

"Wood damaged by termites can be easily distinguished from decayed wood. Termites honeycomb the wood with definite tunnels; these are separated by thin partitions of sound, firm wood."

"Wood decay is caused by fungi, which are plants consisting of microscopic threads . . . the decay fungi weaken or destroy the fiber. These cannot work fast at temperatures below 55 to 60°F., and *not at all in dry wood*. There is no such thing as 'dry rot'; decayed wood is often dry after it has rotted, but not while the decay is taking place."

"The decay fungi soften the wood and in the final stages cause it to shrink and crack or crumble."

Scientific multiple aluminum, by insulating against vapor and heat flow, keeps the area beyond the insulation colder and drier, thus retarding fungus growth and timber rot.

"10 Essential SAFEGUARDS AGAINST TERMITES AND DECAY"
will be found in U.S. Bulletin 1993,
obtainable free by sending the coupon.

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Manufacturers of Scientific Multiple Aluminum Insulation, which retards Fungus Growth and Timber Rot.

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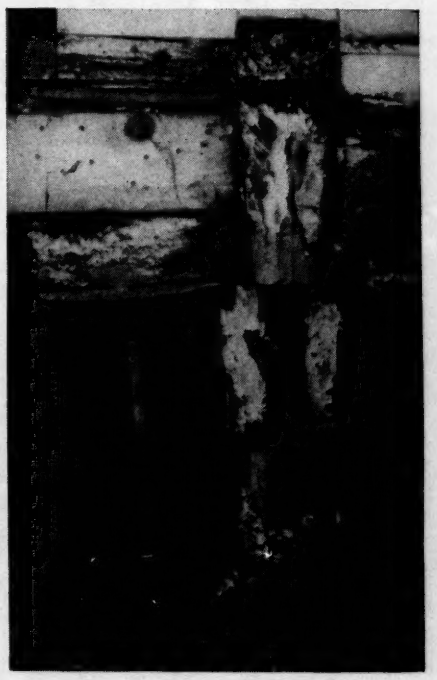

A water-conducting fungus attacked untreated oak piers of this 5 year old house and continued to decay sills, joists, and studs to a height of 6 ft.

USDA Photographs

WASHINGTON OVERTONES *(Concluded from page 6)*

public housing. (Current legislation authorized 35,000 units each in fiscal 1957 and 1958.)

- Proposed $200 million for college housing; up from House-passed $150 million.

- Approved House-passed $250 million grant for slum clearance and urban renewal.

- Granted liberal loan authorization in financing construction for elderly people and others having special needs. For the first time, Fannie May (Federal National Mortgage Association), would be permitted to advance funds to builders of this special-assistance type of housing.
- Sub-committee proposal to increase borrowing authority of Fannie May by $1,250,000,000 was rejected by full committee. Instead, the Senate Banking Committee voted for the administration total of $2.1 billion, an increase of half a billion over present authorizations.
- Rejects its sub-committee's proposal to lower minimum down-payments required on FHA-insured loans. Sub-committee proposed 2% down payment on first $12,000 of appraised value; 35% of value between $12,000 and $20,000.
- Senate-House conferees are expected to compromise this difference in down payment rates. Probable is a 3 percent down payment on first $10,000; 15% between $10,000 and $16,000; 30% between $16,000 and $20,000 (top limit of FHA loans).

Downtrend of housing starts, after six-month slide, **halted during April.** Seasonally adjusted, the 92,000 starts reported were at annual rate of 940,000. This is considerably above the 880,000 projected annual rate noted in March, but far below the 1,157,000 annual rate reported in April of last year.

Outlook for industrial, commercial, military and other construction is **favorable** for air-conditioning, plumbing and heating industries.

- Industrial building, now 18 percent ahead of 1956, should end the year at least 10 percent ahead of '56.
- Institutional building is reported at 15 percent above last year; office construction picking up after a slight lag, and commercial projects are reported at one percent below this period of 1956.
- Public construction is reported far ahead of last year. Military housing is up 45 percent; school bond issues approved indicate a 15 percent increase in educational buildings; hospital totals should total 23 percent above last year. Highway construction is up 10 percent, and new U.S. pollution assistance programs will encourage many water-sewage projects.

Straw-in-the-wind re inflation—

In February, General Services Administration discontinued its plans for lease-purchase construction of needed federal buildings in 20 states. Announced purpose of halting the program was "to relieve inflationary pressures".

Resumption of the program was announced in May by GSA. Bids are asked for 39 projects. GSA indicates that inflationary pressures have been replaced in some areas by construction labor surpluses, together with levelling construction costs.

- Internal Revenue Service is one of the government agencies considering **air-conditioning "a necessity"** under certain conditions.

IRS Bulletin No. 18, Revenue Ruling 55-261 states:

"It is held that the cost of an air-conditioning device, plus operating expenses, less any resale value, constitutes an allowable deduction (for income tax purposes) subject to prescribed limitations".

- The Bulletin lists respiratory allergies and heart trouble as circumstances where air-conditioning may be "prescribed".

This processing tank employs wrought iron pipe for heating coils. Excellent bending properties, as well as corrosion resistance, lead to wrought iron's selection for this installation.

Wrought Iron Pipe's ductility permits speedy bending and stretching without rupturing the metal

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Evidence of wrought iron pipe's excellent bending properties is the extensive use of the material for heating coils, refrigeration coils and air brake piping where short radius bends are necessary. You can tack on the corrosion and fatigue resisting properties of the material, too, for its acceptance in these applications. Our technical bulletin, *The Bending and Flanging of Wrought Iron Pipe,* shows how to produce uniformly superior results. Write for a copy. A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.

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Wrought iron produces sound welds by any of the commonly used processes because it is self-fluxing. Complete line of wrought iron welding fittings for pipe is available in sizes ¼" to 12".

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The machining and threading properties of wrought iron pipe are excellent. The uniform structure of the metal contributes to smooth, sharp threads.

BYERS Wrought Iron Tubular and Hot Rolled Products

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BRIEFLY STATED

• **Among the Engineers—Cosentini Associates,** consulting engineers, and **Eitingon and Schlossberg Associates,** associate electrical engineers, are in new offices at the Coliseum Tower in New York . . . Formation of a marketing consulting firm specializing in gas air conditioning with headquarters in Dallas, Tex., was announced by **Donald M. Mayne,** who has been in the gas air conditioning business for over 20 years . . . The architectural and engineering offices of George C. Nickum and Sons, and Lamont and Fey have joined forces under the name of **Nickum, Lamont and Fey,** to better serve the interests of their growing clientele in the Pacific Northwest, it was announced . . . Donald W. Mackenzie, formerly with Williard, Inc., is now a partner in **Wm. R. Funk Associates** of Philadelphia.

• **With the Societies and Institutes**—New chairman of the Technical Practices Committee, **National Association of Corrosion Engineers,** is E. C. Greco, United Gas Corp., Shreveport, La. . . . Responsibility for development of training and safety programs for the **Powder Actuated Tool Manufacturers' Institute** belongs to A. G. Lane, named to a newly created post . . . Harry M. Pier leaves his post as special assistant on air pollution activities at Research-Cottrell, Inc., to assume new duties as executive secretary of **Air Pollution Control Association,** Pittsburgh, whose Golden Jubilee is celebrated this month . . . Paul R. Achenbach has rejoined the staff of the Building Technology Div., **National Bureau of Standards,** to head the newly reorganized Air Conditioning, Heating, and Refrigeration Section. The new section's work will involve the determination of design criteria for and the development of methods of evaluation and standards for air conditioning, air cleaning, heating, humidity-controlling, refrigerating, and ventilating processes and systems for buildings and other enclosed spaces.

• **Among the Manufacturers' Personnel**—G. C. Van Heusden has been promoted by **Chase Brass & Copper Co.** to district manager of its new New York warehouse and office at Maspeth, L. I. He succeeds Herbert H. Bartlett who is retiring after 31 years with the company . . . Stan Osborne has been appointed field representative for the Los Angeles branch of **General Controls Co.,** Glendale . . . **Iron Fireman Mfg. Co.,** Cleveland, announced the election of Lewis J. Cox as first vice-president and chief executive officer, following the death of Ex-President Wayne F. Strong on March 28. Named as vice-president was R. K. Handley, who continues to be responsible for company's manufacturing facilities. Also named as vice-president was Orval D. Berry. He has been manager of the company's Electronics Div. . . . L. H. Drayton, formerly supervisor of advertising for **General Electric's Weathertron Dept.,** has been named manager of advertising and sales promotion by the company.

Louis Blendermann is appointed director of research and engineering for **Jay R. Smith Mfg. Co.** Widely known as an author of many technical articles on piping and plumbing, his column appears each month in *Air Conditioning, Heating and Ventilating,* and in *Heating, Plumbing and Air Conditioning NEWS.* Mr. Blendermann had been associated with the firm of Walker, Smith & Smith . . . E. W. Matson, new supervisor of planning for **Airtemp Construction Division,** will have the responsibility of coordinating material procurement, order handling, and production scheduling . . . Arthur T. Mesereau, representative of **Josam Mfg. Company** in New York since 1930 has been elected a vice-president of the company. Former Newark representative Joseph A. Maloney is advanced to the position of Metropolitan district sales manager, and M. M. Frankel is the new northern New Jersey rep.

Worthington Corp. announced the election of Walther H. Feldmann as president, succeeding Edwin J. Schwanhausser, who became vice-chairman. Hobart C. Ramsey continues as chairman and chief executive officer. Company's **Mueller Climatrol Div.,** Milwaukee, announced the appointment of George D. Wookey as regional sales manager. It's Mueller's 100th anniversary this year.

The Trane Company has just completed a 1¼-million dollar technical design center. The engineering building is located adjacent to its research and testing laboratory so that the two departments will be able to avail themselves of each other's services. Also announced was the company's selection of Clarksville, Tenn., as the site for its Southern plant; the award of a contract to provide air conditioning equipment for 30 subway cars for the Hudson and Manhattan Railroad Co., providing 10-ton systems for each car with a complete air change every minute; and appointments of John Kennedy as manager of industrial engineering.

Charles C. Cheyney, vice president, sales, **Buffalo Forge Co.,** died suddenly while on a business trip. A former president of the National Assn. of Fan Mfgrs., he will be remembered for his work in the standardization of codes and testing procedures for fans and blowers . . . **Dunkirk Radiator Corp.** announced the death of its president and treasurer, Lewis M. Murray. He had been with the company since 1928.

Retirement of Fabian C. McIntosh as manager of its Pittsburgh branch was announced by **Johnson Service Co.** He is succeeded by his former assistant, Edwin A. Smith . . . Joseph W. Greene moves up from his post as director of industrial sales to head up **Crane Co.'s** realigned department as vice-president of sales. National distribution will be centralized under his guidance . . . Promotion by **Minneapolis-Honeywell Regulator Co.** of five men to new administrative positions included the following: James S. Locke, sales manager of its commercial division since 1946, became manager of operations for the Minneapolis Div., a newly created position; Ralph W. Crysler is manager of sales, Fred C. Brandt is manager of technical services, and Jerome F. Cummiskey is assistant manager of sales for the commercial division, which is under the direction of John E. Haines, a vice-president . . . Addition of L. A. Prillaman and Howard Pope to its sales force was announced by **Stromquist & Co.,** Atlanta, manufacturer's representative for **Maxon Premix Burner Co., National-U.S. Radiator Corp.,** and **York Shipley, Inc.**

Leland L. Bogle has been appointed sales representative of **The Fairbanks Co.,** New York City, in

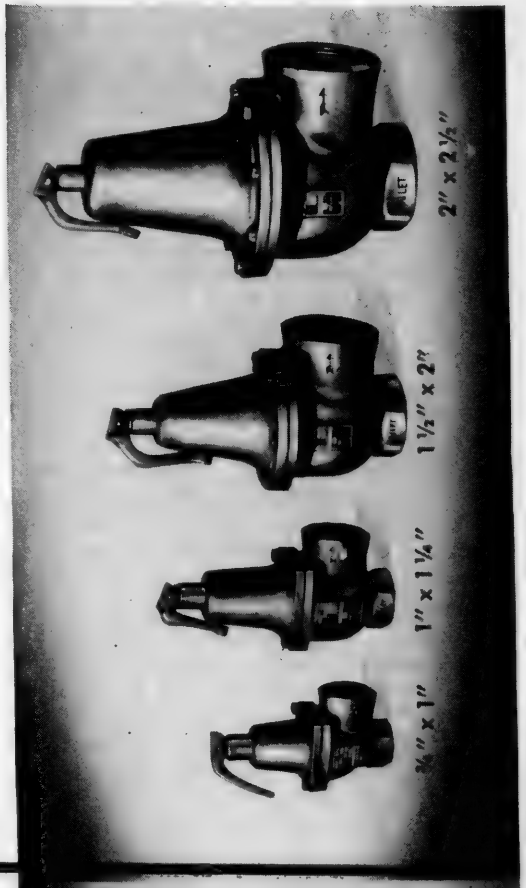
(Concluded on page 12)

new

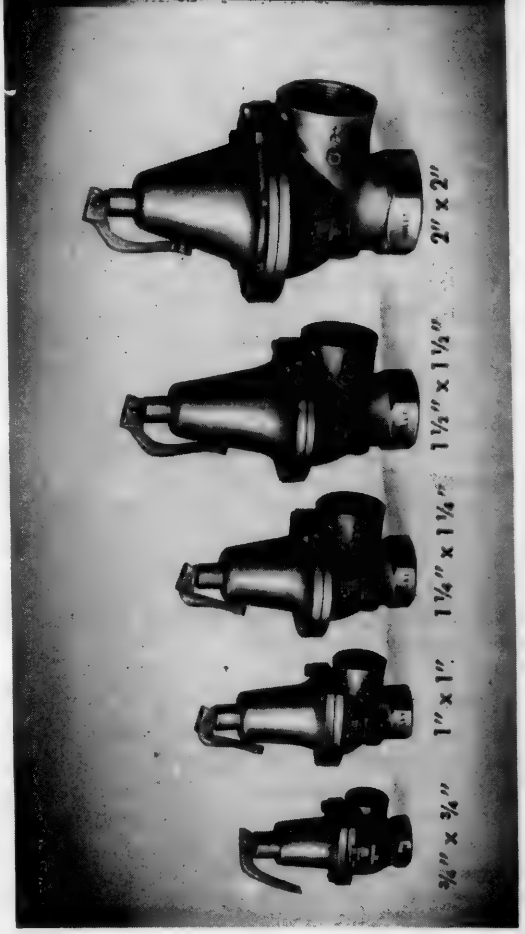
A.S.M.E. *RATED*

Pressure Safety Relief Valves

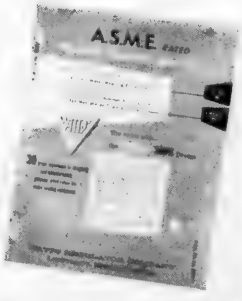
No. 74A-740 Series — EXPANDED OUTLETS
These valves have large internal flow areas and increased outlets to afford individual relief valves with exceptionally high BTU/HR steam discharge capacity ratings. They are especially designed and rated for hot water *space heating boilers.*



174A Series — Same size inlet and outlet connections
174A Series afford complete pressure protection for the great majority of all hot water *heating* and *supply* boilers with a single valve. The completeness of 174A Series, No. 74A, and 740 Series line makes it possible for you to meet the smallest or largest requirements for pressure protection from one line of valves.



For complete Specifications, Ratings, and Application Information on A.S.M.E. Rated Valves . . .



Send for **F-ASME**

WATTS REGULATOR COMPANY

Lawrence, Massachusetts

Plumbing and Heating Safety Valves and Controls

BRIEFLY STATED

(Concluded from page 10)

the territory of Tennessee, Alabama, and northern Mississippi. He will live in Birmingham . . . Representing **Lawler Automatic Controls, Inc.** in Chicago will be Andy Wehrli and Bob Brumitt, two plumbing-heating veterans . . . In the Rocky Mountain area, Jack W. Davis, Lakewood, Colo., is the new sales manager for **Johns-Manville Pipe Div.** . . . Sales manager for Kenco Pump Div., **American Crucible Products Co.,** is James G. Huiett, formerly the division's service manager.

Election of Carroll V. Roseberry, a veteran of 23 years with **Westinghouse Electric Corp.,** to a vice-presidency in the company and his appointment as manager for the midwestern region, with headquarters in Chicago was announced. . . . Since 1952 with Bastian-Morley Co., Inc., F. G. "Jerry" Johnson is now sales manager of Heating and Air Conditioning Div., **Century Engineering Corp.,** Cedar Rapids. His background is warm air, radiator heat in domestic, commercial installations. . . . L. E. Cover, who retired April 1 from Armstrong Cork Co. after over 41 years of service, is now a consultant to Appliance and Equipment Products Div., Owens-Corning Fiberglas Corp. He's a refrigeration insulation specialist . . . Herold S. Jordan has joined the Los Angeles sales office of **Sporlan Valve Co.** He will assist in covering southern California and Arizona . . . In Kansas City, Mo., the **Marley Co.** announced that Vice-president Lyle A. Christensen will take over the newly created position of manager, sales and advertising. Vice-president F. B. "Frosty" Reed will succeed him as general sales manager . . . At the Pittsburgh district office of **Allis-Chalmers Industries Group,** John H. Baisley is appointed manager, metals industry sales; E. E. Ellis manager, general industrial sales; and L. H. Walke, manager, utility sales.

Placed in charge of its newly formed Machinery and Systems Div., and responsible for the **Carrier Corp.'s** integration and acquisition program, is Vice-president George Lilygren. Charles V. Fenn succeeds him as general manager of Machinery and Systems Div. The company's Unitary Equipment Div., following the retirement of John M. Bickel, vice-president and general sales manager, announced that George T. Long is named director of marketing, and Wm. A. Lake, sales manager.

A construction worker who joined **The Babcock & Wilcox Co.** in 1924 and within five years had risen to district inspector, was chosen president of the company by its board of directors. M. Nielson is succeeding Alfred Iddles, who is retiring after serving as president since 1948.

• **Branching Out**—Purchase of the Furnace Div., **Jackson & Church Co.,** is announced by **York-Shipley, Inc.** Included is the furnace division of **Timco Corp.,** a wholly owned subsidiary of Jackson & Church. The parent company can now offer a complete line of both gas and oil-fired residential, industrial, and commercial warm air heating equipment. Richard J. Hoover, who joined York-Shipley in 1956 after six years with Jackson & Church, will be manager of the Jackson & Church division. F. C. Adams and F. E. Young, remain sales manager and assistant sales manager, respectively, of the new division. Howard K. Beck, until now president of Timco and Jackson & Church furnace division, is remaining with Jackson & Church and has been appointed executive vice-president.

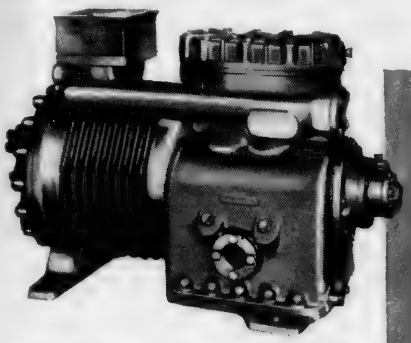
The proposed merger of Birtman Electric Co. and Whirlpool-Seeger Corp. has been approved by the stockholders of both corporations. Officers and directors of Whirlpool-Seeger will continue as officers and directors of the merged corporation, the name of which will be **Whirlpool Corp.**

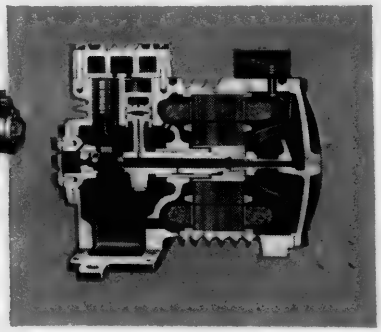
• **Name Changes**—At its annual meeting on April 16, Union Carbide and Carbon Corp. became **Union Carbide Corp.,** and the following divisions of the company changed their names from: Carbide and Carbon Chemicals Co. to Union Carbide Chemicals Co., Linde Air Products Co. to **Linde Co.,** and Carbide and Carbon Realty Co. to **Union Carbide Realty Co.**

• **New Sales Representatives**—Laurence Trant & Co., with offices in Norfolk and Richmond, and Lancaster May & Co., of Baltimore and Washington, D.C., bring the total of new sales representatives appointed by **Buensod-Stacey,** Inc. to twenty-four, with coverage of 30 major cities for the company's dual duct air conditioning equipment. Distribution program started in January under the supervision of Joseph W. Kreuttner, vice-president in charge of sales . . . **Research Products Corp.,** Madison, Wis., has appointed Western Sales Service of Denver and Salt Lake City as its representative in Colorado, Utah, Wyoming, Montana, and southern Idaho . . . Stevens Supply Co., Radford, Va., is named a distributor of **A. M. Byers Co.** wrought iron pipe.

E. F. Edwards resigned his position with **York Corp.** to become the president of his own company, E. F. Edwards Co., an independent franchised associate of the Borg-Warner subsidiary . . . **Marsh Heating Equipment Co.** has appointed R. B. Sweet and Associates to cover its Philadelphia territory, and J. N. Doyle Co. to represent them in Colorado . . . Establishment of a sub-branch office of **Wheelco Instruments Div., Barber-Colman Co.** in Columbus, Ohio, is announced. Office is under the management of H. J. Hoffman . . . Two new district sales offices were opened by **Dunham-Bush, Inc.** Its southeastern district office, under Frank Carryl, is in Atlanta, with sub-offices in Miami, Jacksonville, Charlotte, and Knoxville. Birmingham, Ala., is the headquarters for the middle southern states office under Charles F. Cox.

• **New Lines—McQuay, Inc.,** manufacturers of heating, air conditioning and refrigeration equipment, has entered the prefabricated chimney field. It will start manufacturing package chimneys in July. The new branch will be headed by Paul C. Van Alstyne, formerly general manager of Van-Packer Corp., also makers of prefab chimneys . . . Organization plans of **Scaife Co.** call for intensified product advancement and distribution of oil-fired heating equipment on its Timken Silent Automatic line after discontinuance of its gas heating and air conditioning lines.





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THE *Accessible* HERMETIC

You can get to direct-drive Copelametic units effortlessly...in a jiffy. No belts or seals, no manual oiling. 90% of service costs eliminated. Models for all applications—air-cooled—from ⅓ through 5 H.P. Water-cooled ⅓ H. P. through 10 H.P.

the easy way to solve a tough problem

So you have a reputation to maintain for high-quality installations in the air-conditioning and refrigeration fields.

And you have worries. You must meet and beat competition. The quality and performance of what you get from your suppliers are a constant concern.

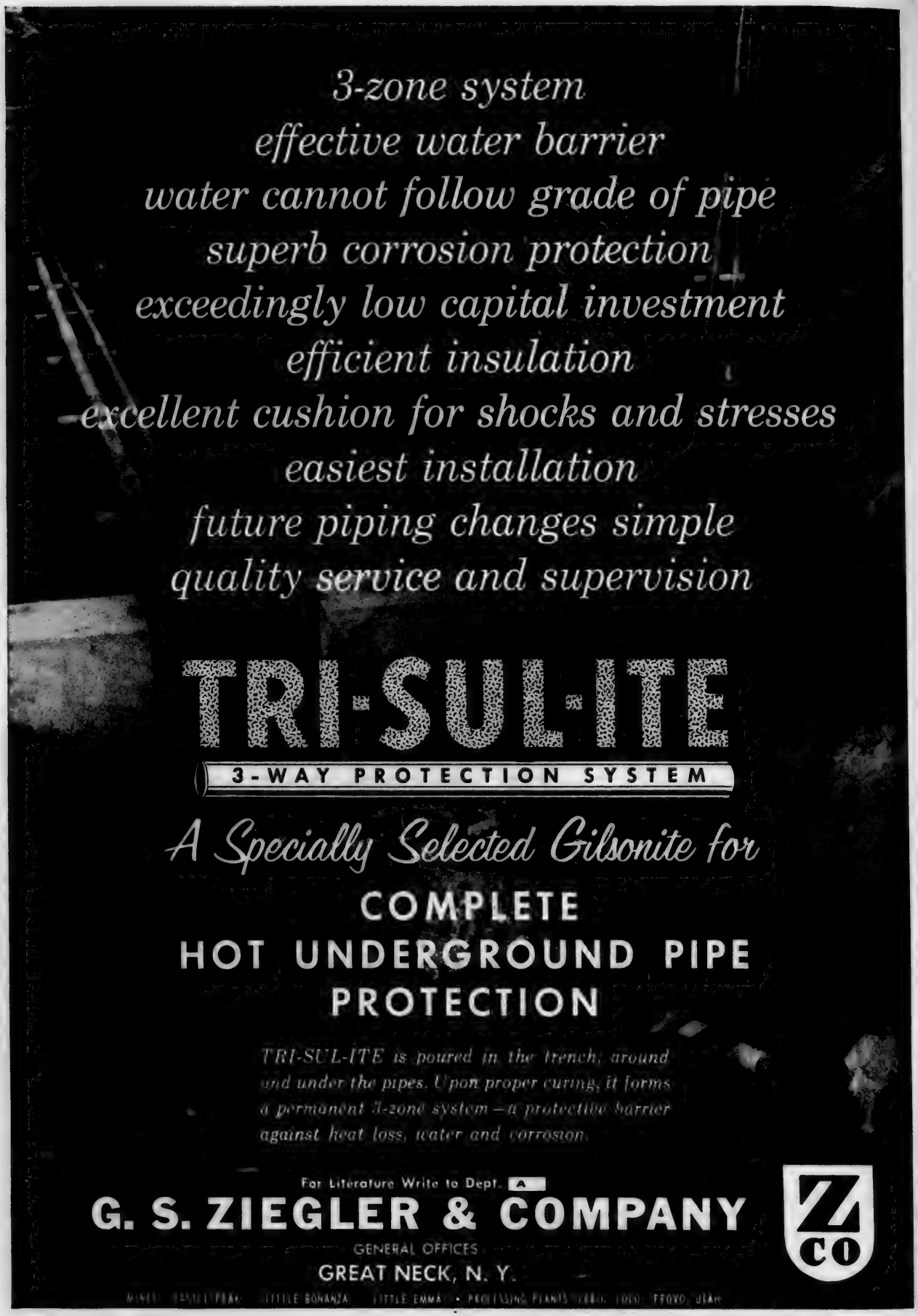
That's the perfect time to make sure there's a Copeland motor-compressor or condensing unit in every piece of equipment you install. For Copeland units are masterfully designed, painstakingly built, are standard with leading manufacturers. Now they're streaming from our spanking-new plant—270,000 square feet of America's most modern manufacturing facilities.

LIVE BETTER ELECTRICALLY

MANUFACTURERS OF THE HEART OF AMERICA'S FINEST AIR CONDITIONING AND COMMERCIAL REFRIGERATION UNITS

SINCE 1918

Copeland REFRIGERATION CORPORATION, Sidney, Ohio


3-zone system
effective water barrier
water cannot follow grade of pipe
superb corrosion protection
exceedingly low capital investment
efficient insulation
excellent cushion for shocks and stresses
easiest installation
future piping changes simple
quality service and supervision
TRI-SUL-ITE
3-WAY PROTECTION SYSTEM
A Specially Selected Gilsonite for
COMPLETE
HOT UNDERGROUND PIPE
PROTECTION
TRI-SUL-ITE is poured in the trench, around and under the pipes. Upon proper curing, it forms a permanent 3-zone system—a protective barrier against heat loss, water and corrosion.
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IF IT'S A "MOTORPUMP" IT HAS A BUILT-IN

Reputation

One sure way to minimize costly call-backs on air conditioning pump installations is to start out with a unit you *know* will stand up on the job without need for excessive maintenance.

By standardizing on Ingersoll-Rand Motorpumps you are offering your customers modern, efficient pumps designed specifically for air conditioning systems. Today, on all types of installations, thousands of Motorpumps are delivering the maximum in efficient, trouble-free operation.

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Motorpumps are available from ¼ to 75 horsepower. Write for our latest literature covering the Motorpump for air conditioning service.

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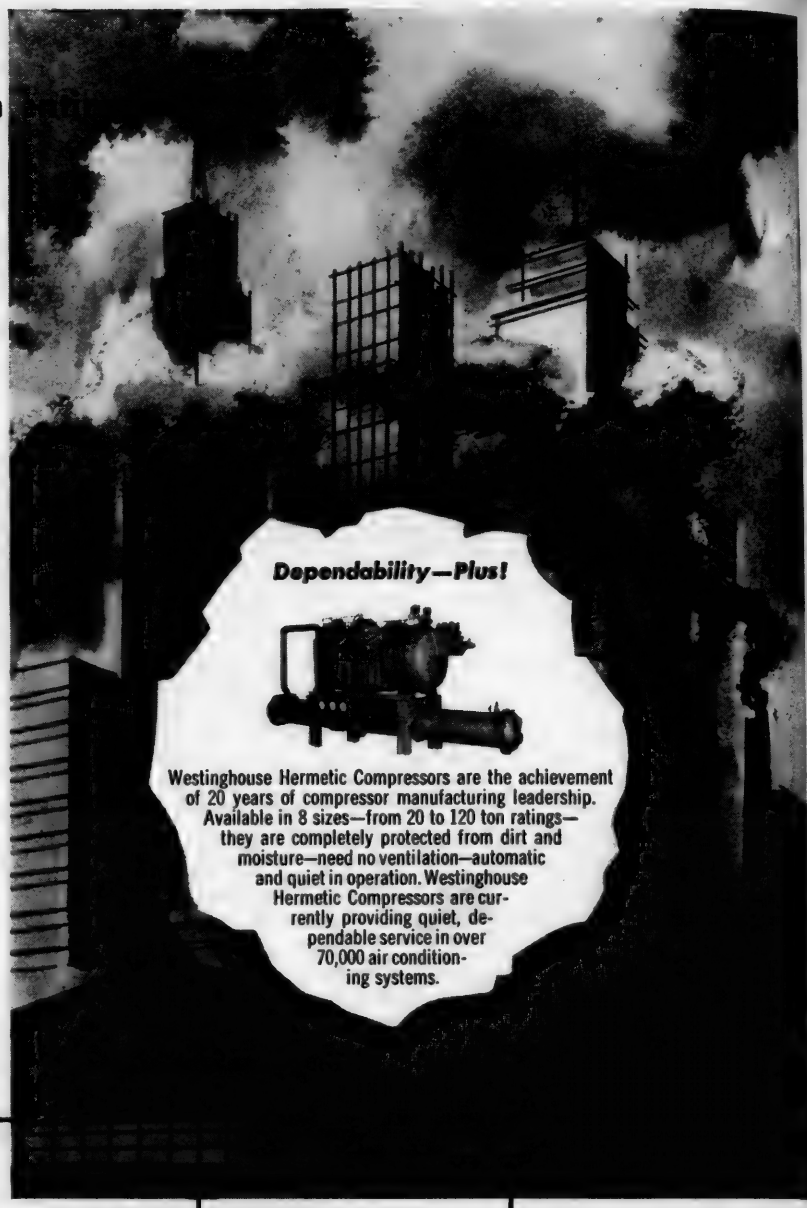
For one building or an

Westinghouse

AIR CONDITIONING MEETS YOUR SPECIFICATIONS!

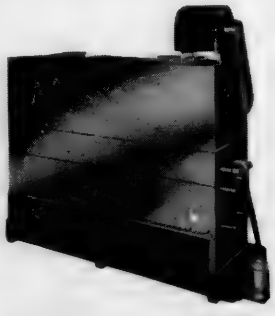
Regardless of size, location, or type of building, Westinghouse Air Conditioning meets any job requirement. You have UNLIMITED FREEDOM of system choice and equipment application with Westinghouse Air Conditioning.

Westinghouse has a quarter-century of experience and leadership in the manufacture of a full-line of Hermetic Compressors, Condensers and Factory-Assembled Packaged Systems. There is a complete selection of components to meet every air conditioning need in commercial or industrial application—all built to exacting quality standards.

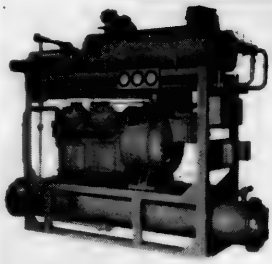


Dependability—Plus!

Westinghouse Hermetic Compressors are the achievement of 20 years of compressor manufacturing leadership. Available in 8 sizes—from 20 to 120 ton ratings—they are completely protected from dirt and moisture—need no ventilation—automatic and quiet in operation. Westinghouse Hermetic Compressors are currently providing quiet, dependable service in over 70,000 air conditioning systems.

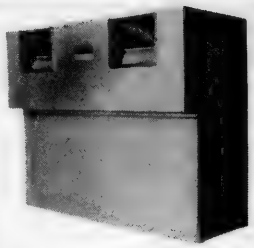


EVAPORATIVE CONDENSERS
Job-proven through the years . . . available in 9 sizes covering a range of 20 to 150 tons. Superior construction with casing hot-dip galvanized after fabrication.



PACKAGED WATER CHILLERS
Completely assembled at the factory to your specifications. Available in more than 1000 combinations—from 2 to 120 ton ratings. Chillers and condensers have ASME approved pressure vessel construction.

WATER-COOLED CONDENSERS
ASME approved construction . . . available in 12 sizes for a total heat rejection range of 15 to 150 tons. All tubes silver solder brazed to each tube sheet.

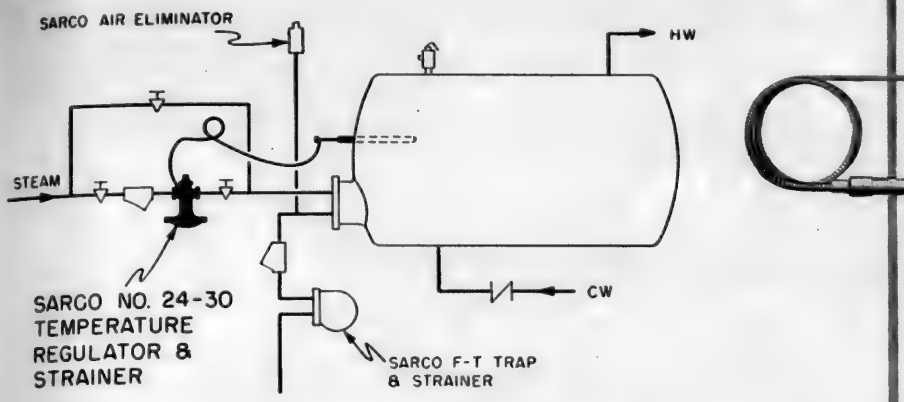


PACKAGED UNITS
Completely assembled water-cooled systems. Available in self-contained packages from 20 to 50 ton capacities. Can be installed with evaporative condensers if desired.

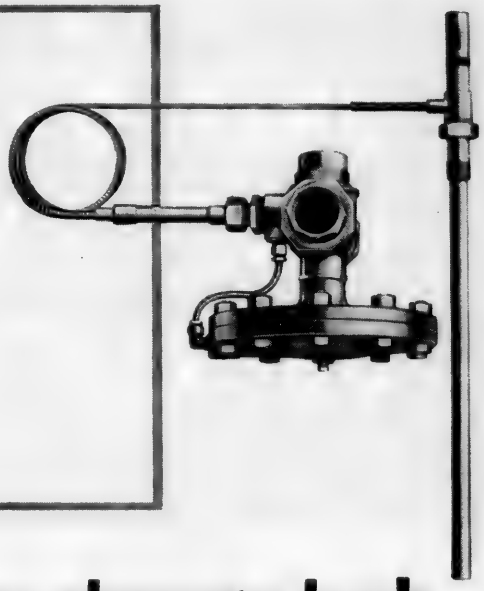
J-80547A

Call the man with all the facts. You'll find your nearest Westinghouse Air Conditioning office in the Yellow Pages, or write: Westinghouse Electric Corporation, Air Conditioning Division, Staunton, Va.

YOU CAN BE SURE...IF IT'S Westinghouse



Typical hook-up of Sarco Type 24-30 Temperature Regulator



HOT WATER...in your storage tank

...when you want it...*and at minimum cost!*

That's the performance you get when this Sarco Temperature Regulator stands guard on your water heater.

With fuel representing about 50% of your total direct power costs, it's important that you *get hot water at lowest cost per wash.*

Here's how the Sarco 24-30 Temperature Regulator does the job:

NO OVERHEATING – during periods of no draw-off. The single seated valve shuts tight, prevents creeping of temperature.

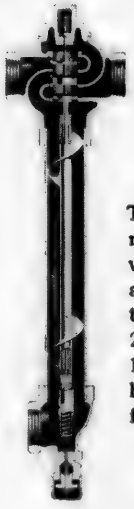
LOW INSTALLATION COST – the T R 24-30 is self-contained and self-operated, no need to install compressed air or electric lines.

CLOSE TEMPERATURE CONTROL – thermostat actuates internal pilot valve which immediately opens or closes main valve.

LOW-MAINTENANCE PACKLESS SEALS – trouble-free design eliminates stuffing boxes, no repacking, no sticking or leakage of exposed valve stems.

WIDE RANGE OF ADJUSTMENT—you can adjust this temperature regulator 25° higher or lower than the temperature setting.

So, if you're not satisfied with your hot water service, call your local Sarco representative or write for Bulletin 600. Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.



Need Tempered Water ?

This Sarco Water Blender automatically mixes hot and cold water, delivers blended water at any desired temperature. Factory set for any temperature to 200° F., is easily adjusted to 15° F. lower and up to 40° F. higher than factory setting. Ask for Bulletin 800.

SARCO

SAVES STEAM

improves product quality and output

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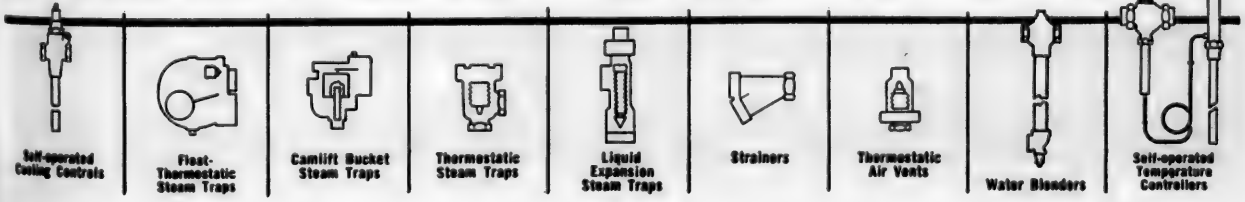
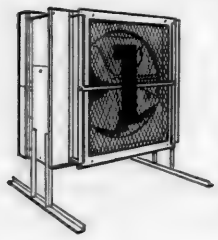


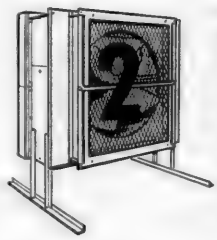
ONLY KRAMER UNICON + WINTERSTAT* GUARANTEES ALL 4

MAXIMUM LIQUID PRESSURE AT EXPANSION VALVE IN WINTERTIME



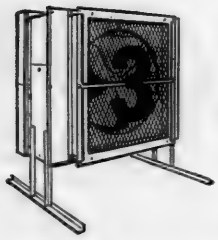
Only the Kramer UNICON plus WINTERSTAT guarantees the full refrigerant pressure *at the expansion valve* for full cooling capacity — even at below 0°F outdoors — *automatically!*

MAXIMUM SUMMER CAPACITY WITH PATENTED WINTERSTAT



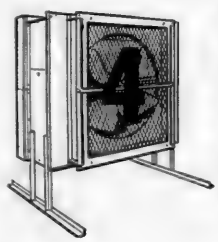
Only Kramer UNICON plus WINTERSTAT guarantees maximum condensing capacity in summer. In hot weather, the patented WINTERSTAT is out of the refrigerant circuit, permitting normal drainage from the condenser without restriction. This assures maximum condensing capacity in summer — *automatically!*

PROMPT DEFROSTING AT ANY OUTDOOR TEMPERATURE



The use of UNICON plus WINTERSTAT makes Kramer THERMOBANK the only low temperature system that can guarantee operation and complete defrosting at any outdoor temperature—even 0°F or lower — *automatically!*

IMMEDIATE COMPRESSOR START-UP REGARDLESS OF OUTDOOR WINTER TEMPERATURE



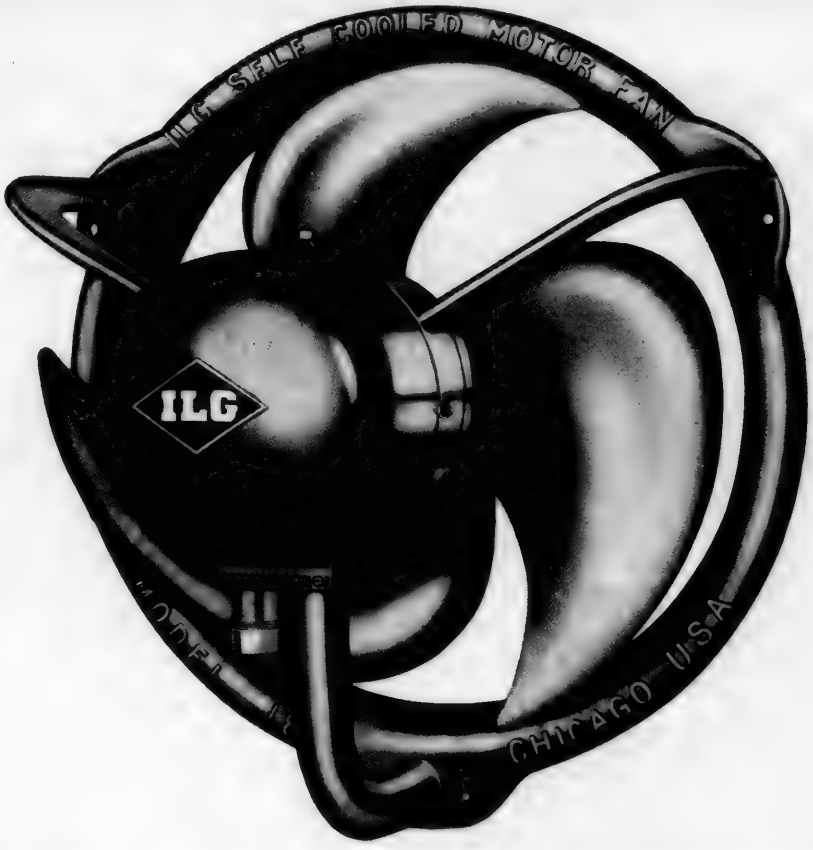
Only Kramer UNICON plus WINTERSTAT (using modification #1) ensures positive and immediate compressor start-up with pressurestat operating the system, regardless of outdoor winter temperatures at the UNICON and regardless of length of compressor lay-off — *automatically!*

**UNICON is a remote type air-cooled condenser WINTERSTAT is a year 'round automatic head pressure control*

WRITE FOR BULLETIN U-210-L

KRAMER TRENTON CO. • Trenton 5, N.J.

43 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER



Ilg Propeller Fans run cool, stay clean. Ilg's direct-connected motor —with permanently lubricated ball bearings—cools itself with outside air whenever the fan is in operation. Quiet, smooth, free-running action is assured by dynamically balanced fan wheel that stays in alignment. No belts or pulleys to wear out... power costs cut up to 10%... Ilg fans cost less in the long run. PFMA label certifies air capacity ratings. The Man from Ilg can help you choose the right size—from 6" to 72". Whatever your ventilation problem, plan to talk it over with The Man from Ilg.

ILG

ILG ELECTRIC VENTILATING CO.

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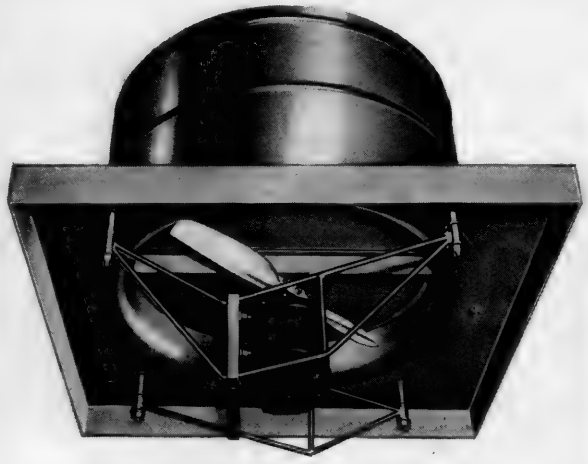
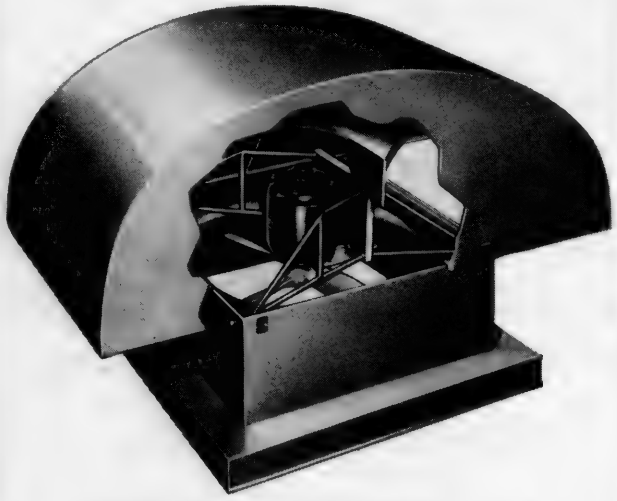
SEND FOR ILG'S INDUSTRIAL VENTILATING GUIDE

Here is practical engineering data for your files . . . the "how's" and "why's" of industrial ventilation . . . types and capacities of equipment recommended for various situations . . . information and diagrams on installation. 30 pages.



HARTZELL VERTIJET — Windband formed from 20 gauge galvanized steel, base from 14 gauge zinc-grip coated steel. Fan ring is integral part of base sheet. Two semicircular galvanized lids at base of windband open automatically when fan goes on, close weather-tight when it goes off. Throat sizes from 18" to 60"



HARTZELL REVERSIBLE ROOF VENTILATOR—One unit does the job of two conventional one-way ventilators. This unit moves air in either direction with equal efficiency; you convert from intake to exhaust at the flick of a switch. Throat sizes from 28" to 44".

Why You Can Count on Hartzell Air-Moving Equipment for Long Life, Rugged Reliability and Minimum Maintenance

Hartzell fans and blowers are engineered and built for the exacting requirements of tough industrial service. There's no compromise with quality for the sake of shaving a few dollars on price. Hartzell fans are designed for the industrial buyer who is willing to pay for long life, dependable service and low maintenance.

Design Simplicity OF HARTZELL *roof ventilators means...*

HIGH EFFICIENCY...

These Hartzell roof ventilators expel large volumes of heat, smoke and fumes quickly and efficiently because simplified design reduces obstructions to air flow. There's no maze of interior braces and supports. And all Hartzell roof ventilators are tested for performance in accordance with Standard Test Codes of the American Society of Heating and Air Conditioning Engineers.

LOW INITIAL COST...

Elimination of complications of design and construction produce savings in production costs which are passed along to you. Hartzell design simplicity means that Hartzell roof ventilators can offer top quality construction for long life and dependable service at a price much lower than that of more complex designs.

MINIMUM MAINTENANCE...

By minimizing the number of moving parts Hartzell reduces the number of things that can go wrong. Lids on vertical discharge models are mounted on corrosion resistant brass rods which turn on heavy Micarta plastic bearings which require no lubrication... won't stick, won't rust. Fan motors are ball-bearing type, conservatively rated for continuous performance. Under normal operating conditions, the only maintenance required will be periodic motor lubrication.

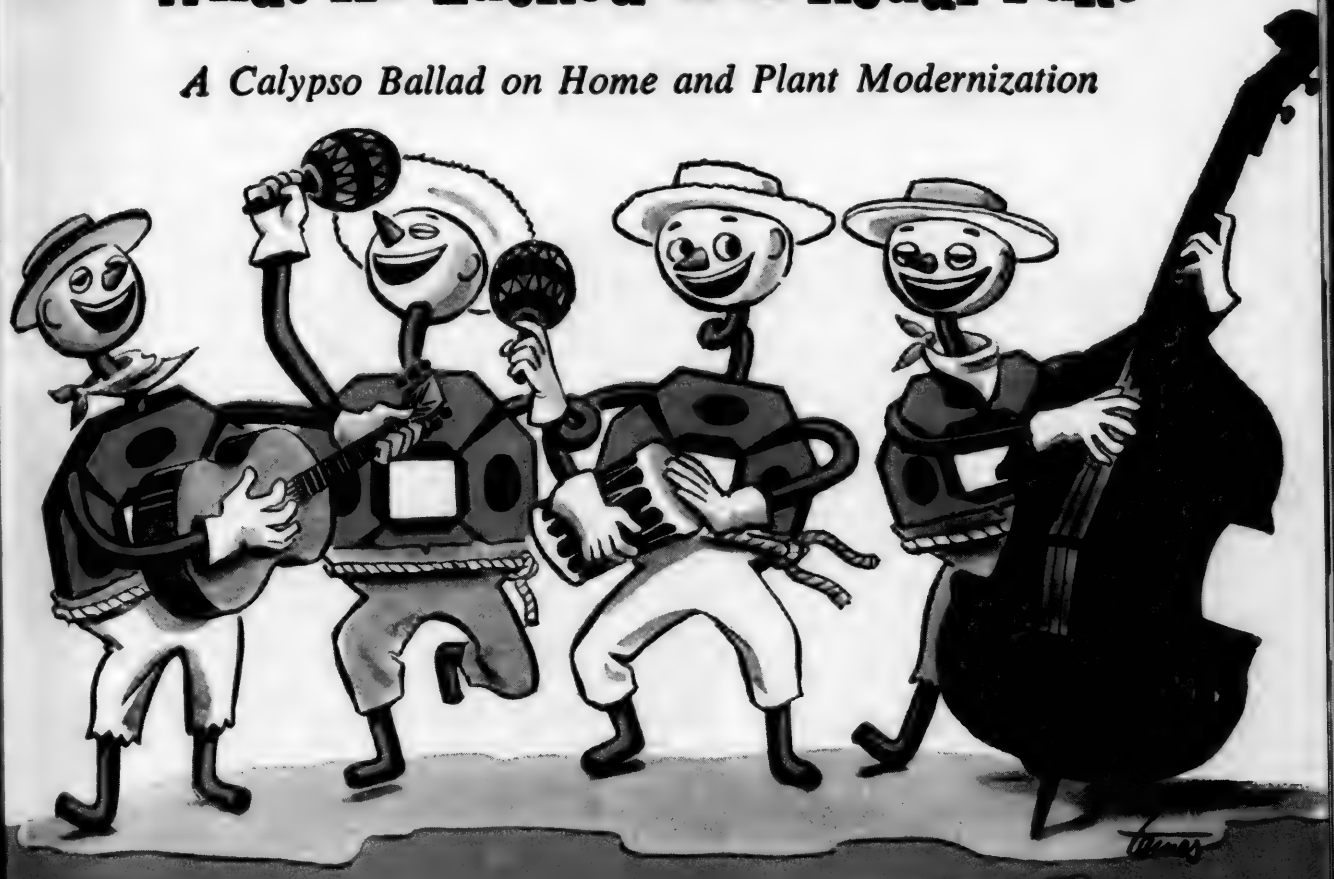
Write today, or ask your nearby Hartzell field engineer for a copy of the free Bulletin A-112A. It contains all the specifications for the two roof ventilators pictured, as well as for Hartzell's Airjet, Rotary and Penthouse roof ventilators.

HARTZELL
PROPELLER FAN CO.
Div. of Castle Hills Corp.
203 Thomas Blvd. • Piqua, Ohio

ENGINEERING OFFICES IN PRINCIPAL CITIES

What He Lacked Was Readi-Pakt

A Calypso Ballad on Home and Plant Modernization



There once was a contractor; sound advice he never heeded.
He specified no brand names when materials he needed.
With home and plant improvement orders he was sitting pretty
But his glaring lack of foresight is the subject of this ditty!

First, our trust-to-luck contractor hadn't specified the brand
Of the copper tube required for the jobs he had on hand.
The tube was slow in coming and the shipments reached him late
So his patrons tried to cancel when he missed each contract date.

When our trust-to-luck contractor checked the tube so long delayed,
He found that, in the shipments, several errors had been made:
The quantities, the sizes and the types were all confused
And his irritated customers, alas, were not amused.

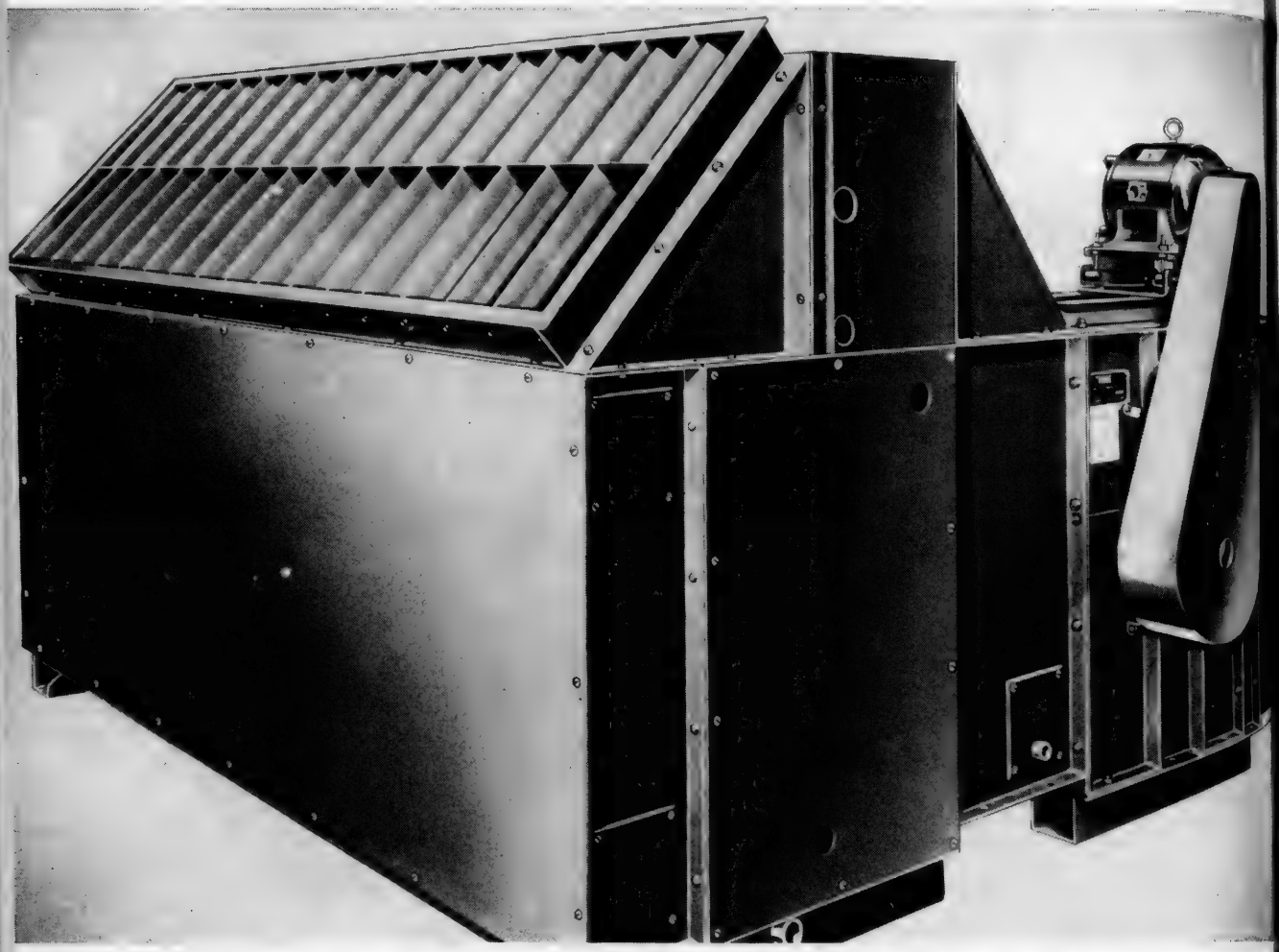
Oh, scores of wise contractors make a point, when they contract,
Of passing their tube problems on to Dr. Readi-Pakt.
This copper tubing specialist most certainly will speed it;
He'll send exactly what you want, exactly when you need it.

MORAL: For peace of mind and for goodwill, be sure of where you're heading;
In ordering your COPPER TUBE, play safe, insist on READING!

READING

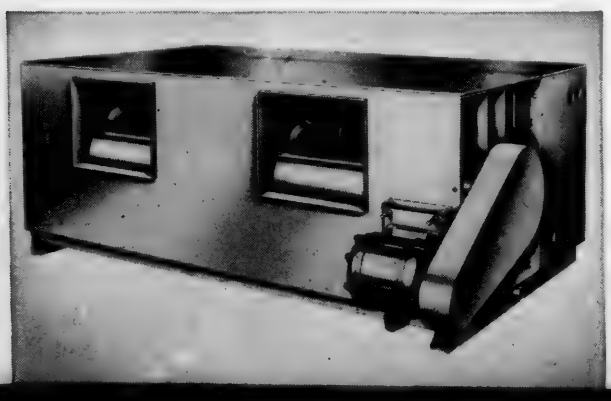
Distribution Depots: READING, PA · WOODSIDE, L.I., N.Y. · CHICAGO, ILL. · CLEVELAND, OHIO · LOS ANGELES, CALIF. · HOUSTON, TEXAS

Different air conditions fo
now yours with one T

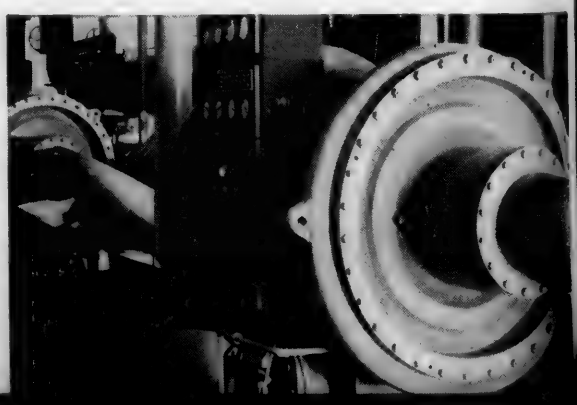


Any condition for any zone! Multi-Zone Climate Changer supplies any desired combination of heating, cooling, ventilating to as many as 25 zones. May also be used as heating and ventilating unit only (standard unit less cooling coil). Complete range of 9 sizes with capacities ranging from 1700 to 29,000 cfm of standard air.

Heat, cool, ventilate one zone with this standard TRANE Climate Changer. Meets the largest possible variety of air conditioning requirements. Horizontal or vertical units; capacities ranging from 600 to 29,000 cfm.



Cut power costs with the TRANE CenTraVac water chiller—the industry's *first* hermetic centrifugal. Automatically throttles down to 10% of capacity or less. Complete range of sizes to 1500-ton units.



for 25 zones
Trane Climate Changer!

Multi-Zone units supply complete air conditioning...or any combination of heating, cooling, ventilating. A different climate for each zone, at the same time!

Here's the ideal air conditioner for many buildings where individual units in each zone would be too costly. It's the TRANE Multi-Zone Climate Changer—a unit designed to supply *independent and variable* control of conditioning for as many as 25 zones, each with different requirements!

The TRANE Multi-Zone Climate Changer is especially suitable for those buildings where one or more zones may require maximum cooling while, at the same time, other zones require less cooling—or may even need *heating.*

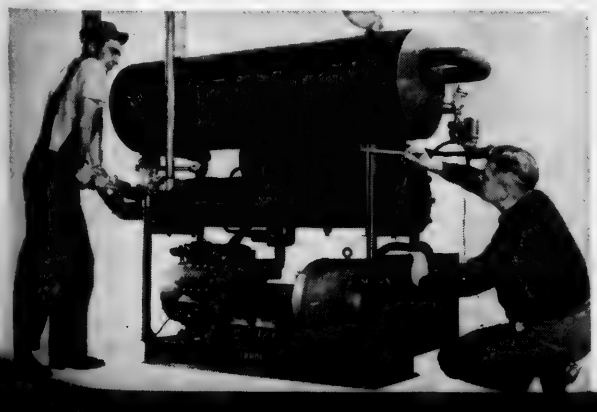
Whatever the individual zone requirements may be, the TRANE Multi-Zone Climate Changer does the job! This versatile, rugged unit supplies complete air conditioning . . . cooling only . . . heating only . . . cooling and ventilating . . . heating and ventilating . . . heating and humidification . . . or ventilating only for in-between seasons—for as many as 25 zones. Each zone can have a different climate *at the same time!* And the Climate Changer furnishes a *constant quantity* of conditioned air at the temperatures required in each zone.

Want more facts? See your nearby TRANE Sales Office, or write TRANE, La Crosse, Wis.

Check these Climate Changer features:

- Provides different air conditions for as many as 25 zones simultaneously.
- Furnishes constant volume of air at varying temperatures . . . does not accomplish temperature control by varying air quantities.
- Centralizes all piping and controls in one location.
- Eliminates use of reheat coils and their controls in the individual zone ducts.
- Enables the use of *one* source of chilled water or refrigerant for DE coils.
- Full-length damper section for each full-length coil smooths out air flow, allows for better air distribution.
- Size and number of zones can be changed on the job.
- Unusually rugged, *sectionalized* construction.

Factory pre-assembly of the TRANE Cold Generator cuts installation time, reduces costly call-backs. Requires only simple water and electrical connections. All components engineered to work together! Capacities to 150 tons.



For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

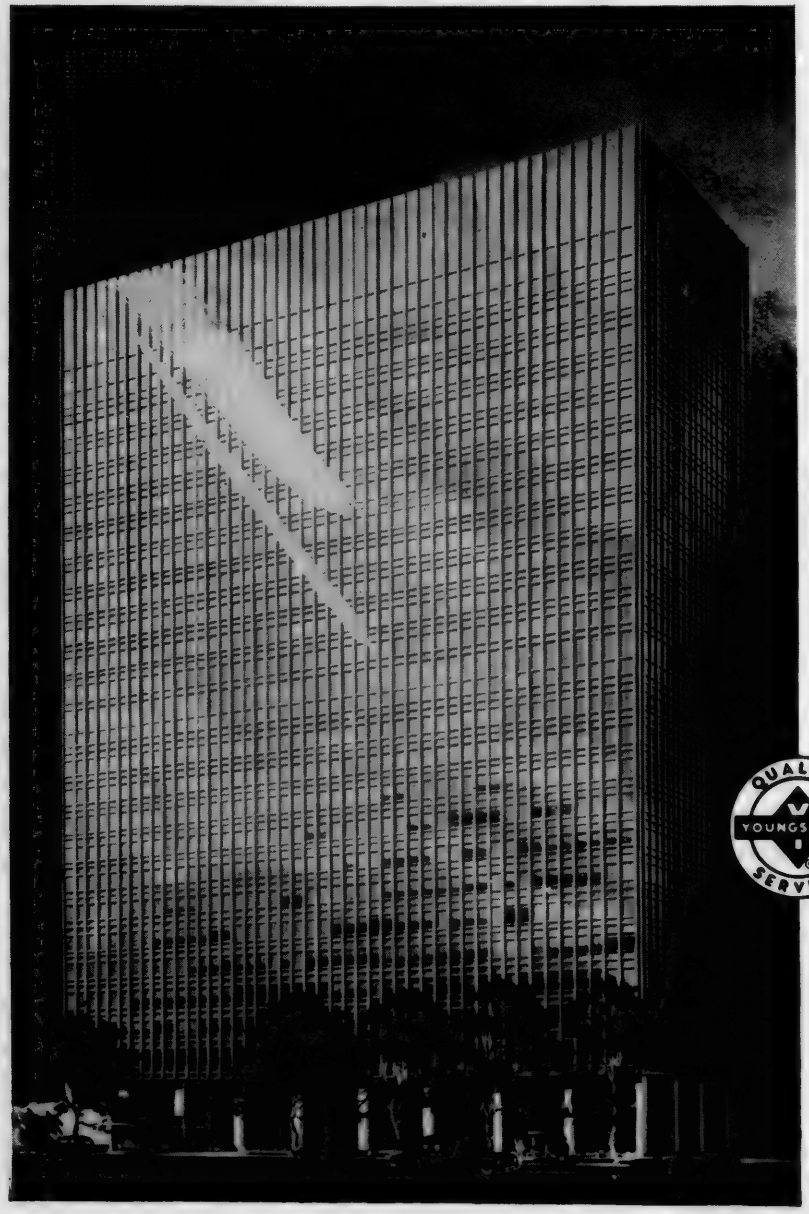
THE TRANE COMPANY, LA CROSSE, WIS. • EASTERN MFG. DIV., SCRANTON, PA. •
TRANE COMPANY OF CANADA, LTD., TORONTO • 90 U.S. AND 19 CANADIAN OFFICES

Cleveland's "Modern as Tomorrow"

ILLUMINATING BUILDING

uses Youngstown Steel Pipe

Building Owner 55 Public Square, Inc., New York, N Y.
(A Vincent Astor-Brooks, Harvey & Company enterprise)
Rental and Managing Agents: Ostendorf-Morris Company, Cleveland, Ohio
Architect. Carson & Lundin, New York, N Y
General Contractor: George A Fuller Company, New York, N. Y
Structural & Mechanical Engineers: McGeorge Hargett & Associates
Consulting Mechanical Engineers: Jaros, Baum & Bolles
Heating & Air Conditioning Contractor: The Feldman Bros. Company, Cleveland, Ohio
Distributor: Grinnell Company, Cleveland



Cleveland's newest architectural beauty — this modernistic 22-story Illuminating Building — will provide much-needed air-conditioned office space for the "Best Location in the Nation". Owner of the new structure, 55 Public Square, Inc., and the architects, wisely chose Youngstown Steel Pipe to provide for a long-lived, dependable water supply system.

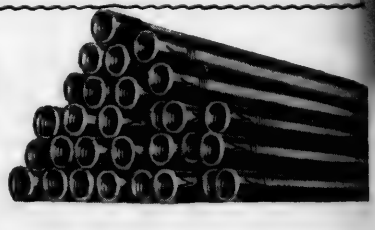
Youngstown Steel Pipe is the best pipe obtainable—anywhere. That's because it's made from our highest quality steel by men who have devoted their lives to the pipemaking business. Each and every step in Youngstown's completely integrated operations is closely quality-controlled by expert metallurgists to guarantee pipe that will meet your most exacting specifications.

Your nearby Youngstown Pipe Distributor has complete and ample stocks in all sizes. Why not call him today and discuss your requirements?

Specify Youngstown and secure these 7 Points of uniform goodness

- uniform ductility
- uniform lengths
- uniform threading
- uniform weldability
- uniform wall thickness and size
- uniform strength and toughness
- uniform roundness and straightness

QUALITY YOUNGSTOWN SERVICE



THE YOUNGSTOWN SHEET AND TUBE COMPANY

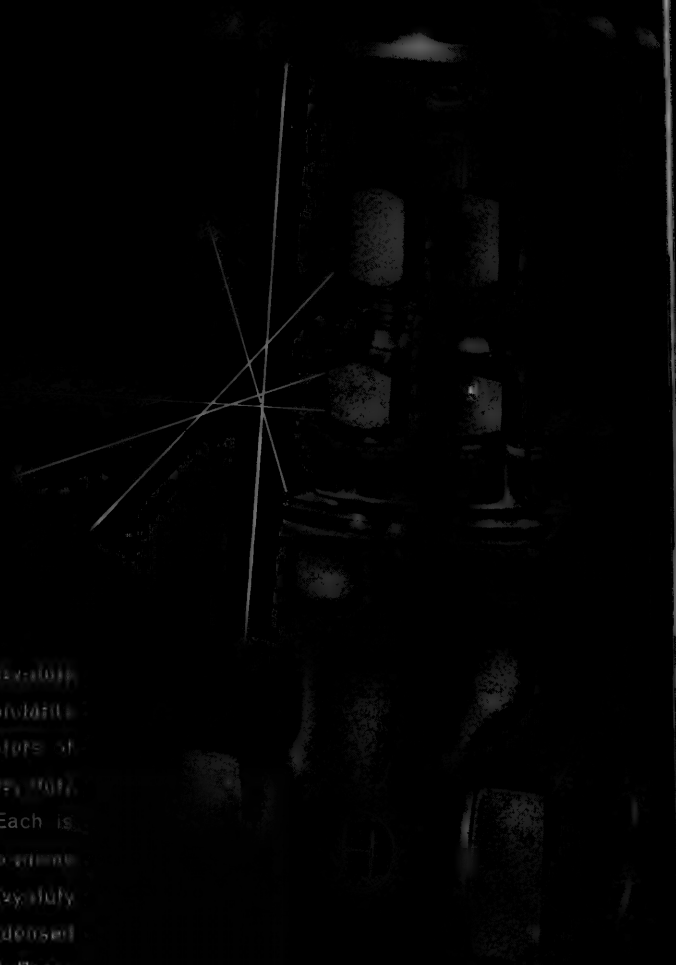
Manufacturers of
Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities

Presenting...

the **HAMMOND**

heavy-duty

bronze valve line



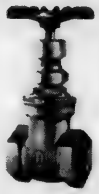
Now the HAMMOND line includes a broad selection of heavy-duty bronze valves — produced to the same high quality standards for which HAMMOND, one of the leading manufacturers of domestic plumbing and heating valves. Each HAMMOND heavy-duty valve is fully tested and meets Federal specifications. Each is backed by HAMMOND's 46 years of experience making bronze valves of every type. Specify HAMMOND whenever you need a heavy-duty globe valve, gate, angle or check valve. Write for our condensed catalog No. 146 and comparable valve chart. Hammond Brass Works, Hammond, Indiana.

Some types of HAMMOND high-pressure valves

#413 Composition disc globe with union bonnet and slip-on type disc holder. To 150 lbs. of steam.

#412 Brass disc regrinding globe with union bonnet. To 300 lbs. of steam.

#610 Quick opening gate valve with cam-operated solid wedge disc. To 125 lbs. of steam.



#619 N.R.S. gate valve with solid wedge disc. To 150 lbs. of steam.

See us in Booth 835 at the NAPC Convention

HAMMOND *BRITE-KOTE*® BRONZE VALVES

How *high velocity* solves problem of *flexibility* in the Medical Towers

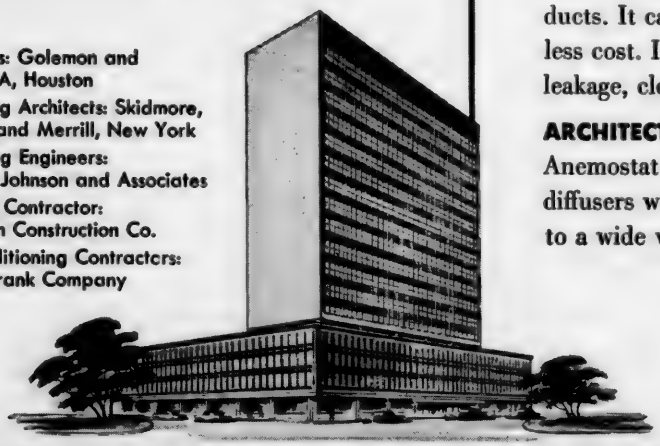
When the new Medical Towers Building in Houston, Texas was planned, the key air conditioning problem was flexibility. Professional office areas had to be subdivided *after* the building was completed. Here's how an Anemostat dual duct high velocity air distribution system solved the problem.

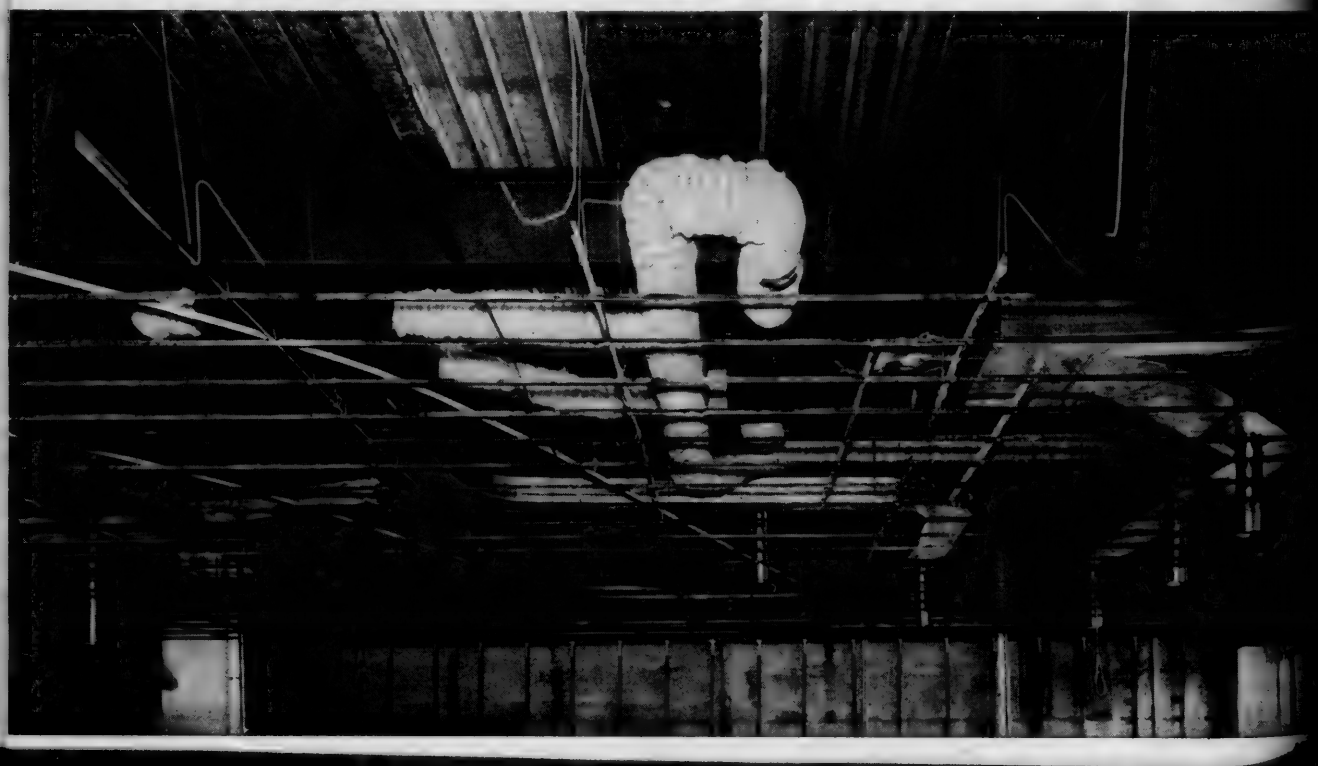
As shown in the diagrammatic sketch, a system of perimeter take-offs from the hot and cold ducts enables each doctor to provide the exact temperature he wants. Temperatures in the various rooms of each suite of offices can be varied. Air distribution is draftless, comfortable, perfectly suited to tenants' needs.

The Anemostat All-Air High Velocity distribution system offers further important advantages. It can be used with smaller than conventional ducts. It can be installed in less time and at less cost. It requires no coils, thus eliminates leakage, clogging and odors.

ARCHITECTS—Attention Please:
Anemostat round, square and straightline diffusers with high velocity units are adaptable to a wide variety of architectural designs.

Architects: Golemon and Rolfe, AIA, Houston
Consulting Architects: Skidmore, Owings and Merrill, New York
Consulting Engineers: Bernard Johnson and Associates
General Contractor: Tellepsen Construction Co.
Air Conditioning Contractors: Straus-Frank Company



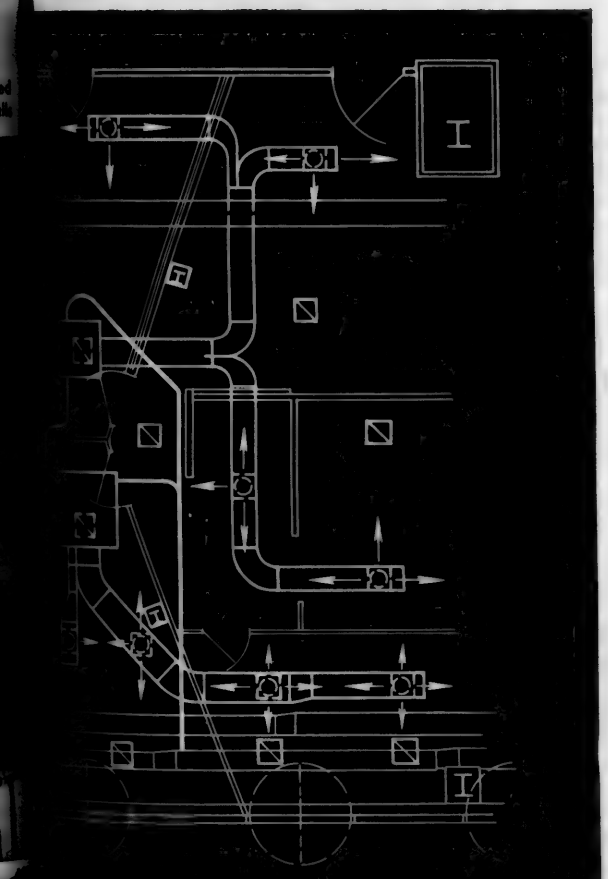


Anemostat HPE units and duct connections installed in office before construction of ceiling and wall

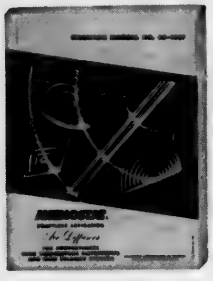
Note how locating of hot and cold ducts saves space in new Medical Towers Building, Houston, Texas

View of lobby showing Anemostat Air Diffusers

View of professional reception room



Layout of typical suite



Write on your business letterhead for your copy of

New Anemostat Selection Manual 60

to Anemostat Corporation of America, 10 East 39 Street, New York 16, N. Y.

ANEMOSTAT: The pioneer of All-Air High Velocity Systems

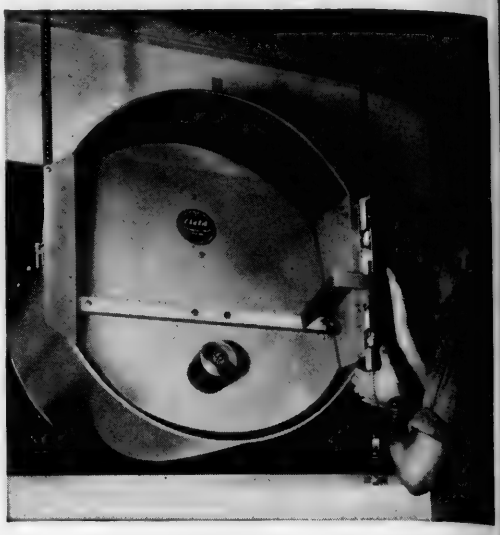
DEPENDABLE,

PRECISELY ACCURATE

Draft Control

for coal fired, oil fired, gas fired or gas-oil fired

HEATING PLANTS



FIELD TYPE "M" for coal and oil fired heating plants

Heavy duty commercial model in 28" and 32" sizes. Heavy, rigid construction assures long, trouble free service. Stainless steel knife edge bearing for permanent sensitivity. Also available in 6" through 24" sizes for domestic and commercial installations. First choice of heating men — the round control you can level on any flue.

FIELD TYPE "MG" for gas and gas-oil fired heating plants

A heavy duty, precision built control in sizes 8" through 32" for commercial and industrial installations. Stainless steel knife edge bearings for permanent sensitivity. Gate opens inward to regulate updrafts, and outward to relieve down-drafts. Optional safety switch available where codes require. Fully proven, accepted virtually everywhere.

They're real HEAVYWEIGHTS

Compare the weight of a Field Control to any other available. Here is proof of the massive, welded construction, long, vibration-free service, that permits Field's supreme accuracy.

Size Control	Thickness of Parts: Gate	Side Plates	Ring	Collar	Wt. without Crtn. or Crate
14 M	16 Ga.	16 Ga.	⅜ x 2"	22 Ga. Galv.	19#
16 M&MG	16 Ga.	16 Ga.	⅜ x 2"	18 Ga. Galv.	28#
18 M	16 Ga.	16 Ga.	⅜ x 2"	18 Ga. Galv.	35#
20 M&MG	16 Ga.	16 Ga.	¼ x 2"	18 Ga. Galv.	41#
24 M&MG	14 Ga.	16 Ga.	¼ x 2"	18 Ga. Galv.	65#
28 M&MG	14 Ga.	14 Ga.	¼ x 4"	14 Ga. H.R.S.	110#
32 M&MG	14 Ga.	14 Ga.	¼ x 4"	14 Ga. H.R.S.	140#

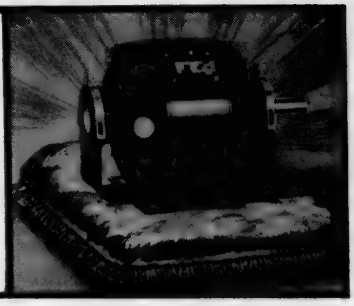
field

FIELD CONTROL DIVISION
of H. D. CONKEY & COMPANY, Mendota, Ill.

Affiliates
Conco Building Products, Inc. • Brick Tile, Stone
Conco Materials Handling Division • Cranes, Hoists

tailor-made for You

. . . and every one a perfect fit



No Sir, no ready-made here. Emerson-Electric motors are custom-engineered for your product . . . *designed* for you, *produced* for you and *priced* for you. It is no longer necessary to design your product around a *standard* motor. Emerson-Electric engineers will work with you through every stage of development. You get the product you want with a motor that EXACTLY suits your purposes . . . a custom-engineered motor at *standard motor prices.* Call, wire or write Dept. M-58 today, The Emerson Electric Mfg. Co., St. Louis 21, Mo.

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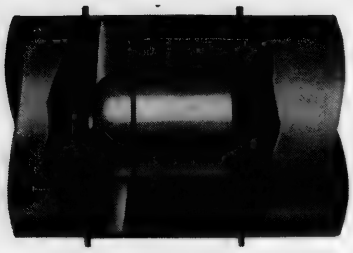
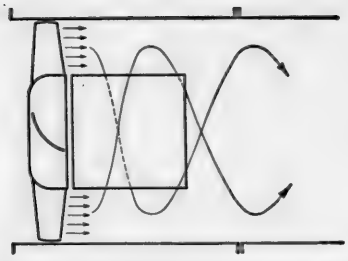
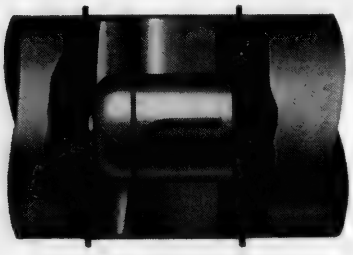


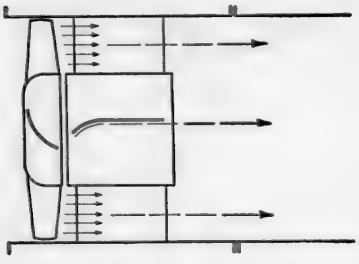
The tubeaxial fan . . . a wide range of volumes at medium pressures, with uniform velocity . . .



. . . at moderate pressures the spiral air discharge straightens out a short distance from fan blades.

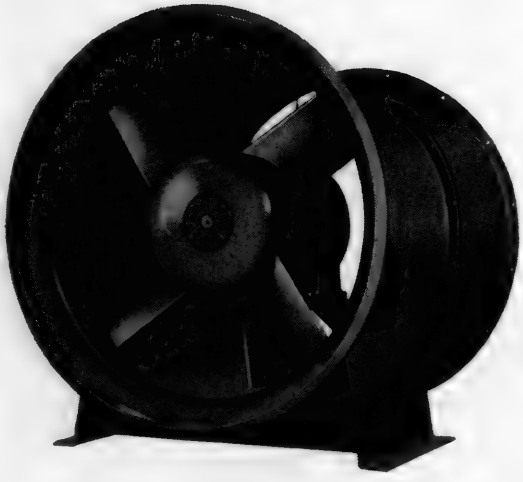


The vaneaxial fan . . . stationary guide vanes reduce turbulence and increase fan efficiency . . .



. . . resulting straight-line air flow leaving fan assures smooth, quiet operation for all conditions.

Easy-to-install American Blower axial fans save space, lower your installation cost



Versatile American Blower axial fans can be mounted vertically or horizontally. When ducts are properly reinforced, the fan can be supported directly by the duct connection.

American Blower axial fans provide straight-line air flow, eliminating elbows, bends, and transformation pieces—can be installed vertically or horizontally in ducts, with minimum foundations and supports . . . with savings in space, first cost, handling, and installation.

These compact, self-contained axial fans are available in three general designs—vaneaxial for direct and V-belt drive, spray-booth vaneaxial for V-belt drive, tubeaxial for direct drive. A complete line of accessories is offered to adapt this versatile line of fans to your particular requirements. Capacities range from 2,500 cfm to 75,000 cfm. Larger sizes are available on special order.

For more information on axial fans, or on other equipment from American Blower's complete air-handling and -conditioning line, call our nearest branch office, or write direct to American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

Division of American-Standard

WE TORTURED THAT WEIRKOTE® TILL IT HURT US TO LOOK!

The heavy tractor's treads crunched into the Weirkote steel, rocked back and forth, gave Weirkote's tight zinc coating a wicked test.

It passed perfectly.

Weirkote shrugs off punishment like that—or far worse—in everyday production. Its continuous-process zinc coating goes through all the severe fabrication steps flawlessly—bending, deep drawing, crimping, twisting or lock seaming. There's no flaking or peeling when Weirkote's on the job.

Weirkote is continuous-process zinc-coated steel at its best—highly resistant to corrosion, heat and noise. And it mounts fast because it's rigid. Takes a lot of kicking around on the building site. Why not check on Weirkote today.

Free Weirkote Booklet!

Send for all the facts on Weirkote. Write Weirton Steel Company, Dept. N-6, Weirton, West Virginia.

WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

a division of

NATIONAL STEEL CORPORATION

Bulletin 736 part-winding starter on large York compressor

GRIPES about lamp flicker cured

with these A-B reduced voltage starters

High starting current inrush—the cause of "lamp flicker"—can be brought down to the power company's limitations with one of the Allen-Bradley starters shown on this page.

Bulletin 640 manual velvet smooth compression resistance starters provide stepless acceleration of the motor from standstill to full speed without lamp flicker.

Bulletin 740 automatic 2-step compression resistance starter . . . the automatic equivalent of Bulletin 640 manual starter.

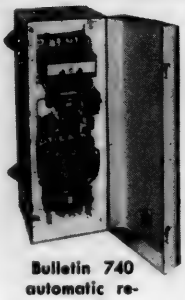
Bulletin 742, the ideal automatic starter for increasing starting current steplessly, thus eliminating "lamp flicker" on network systems.

Bulletin 646 is a manually operated autotransformer type starter with either 2 or 3 reduced voltage taps.

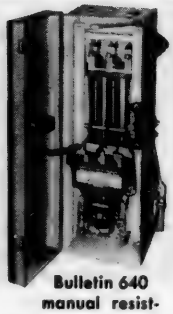
Bulletin 746 automatic equivalent of Bulletin 646 manual starter. Rated up to 300 hp, 220 v; 600 hp, 440-550 v.

Bulletin 736 part-winding starter, shown above, can be used with squirrel cage motors having two separate parallel stator windings. Where starting current comes within power company's limitation, the result is a satisfactory, low cost installation.

When you have difficulty in deciding which starter to use, an Allen-Bradley sales engineer will gladly help you with your problem. Please call our nearest office.

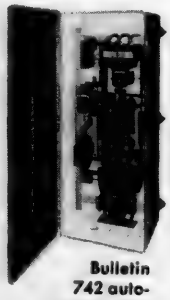


Bulletin 740 automatic resistance starter.

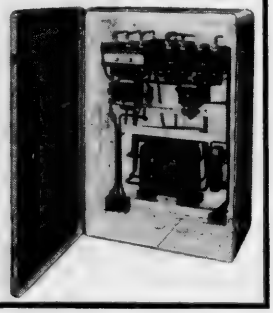


Bulletin 640 manual resistance starter.

Bulletin 646 manual autotransformer starter.



Bulletin 742 automatic resistance starter.



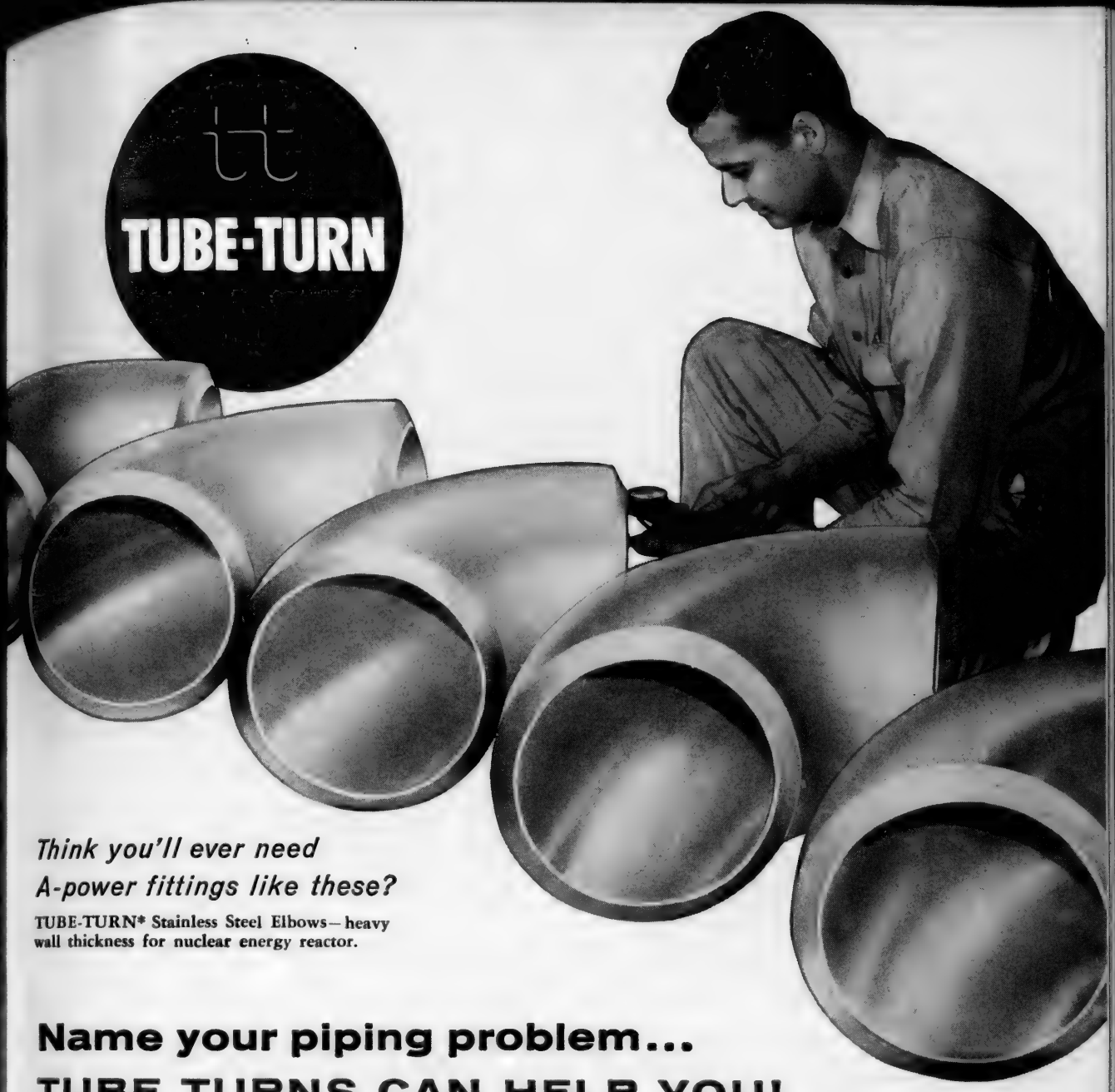
Bulletin 746 automatic autotransformer starter in general purpose enclosure.

Allen-Bradley Co.
1330 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY



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A-power fittings like these?

TUBE-TURN* Stainless Steel Elbows—heavy wall thickness for nuclear energy reactor.

Name your piping problem...
TUBE TURNS CAN HELP YOU!

No matter what kind of welded piping system you build . . . here's how Tube Turns can be of help:

Tube Turns' line includes 12,000 *standard* welding fittings and flanges, plus thousands of *specials* such as the A-power fittings shown above. When you buy from this *complete-line* leader, you get what you need *promptly* . . . products of unsurpassed *quality* . . . backed by experienced *engineering service* . . . for reliable, *low-cost piping.* Order from your nearby Tube Turns' Distributor.

*"TUBE-TURN" and "tt" Reg. U. S. Pat. Off.

The Leading Manufacturer of Welding Fittings and Flanges

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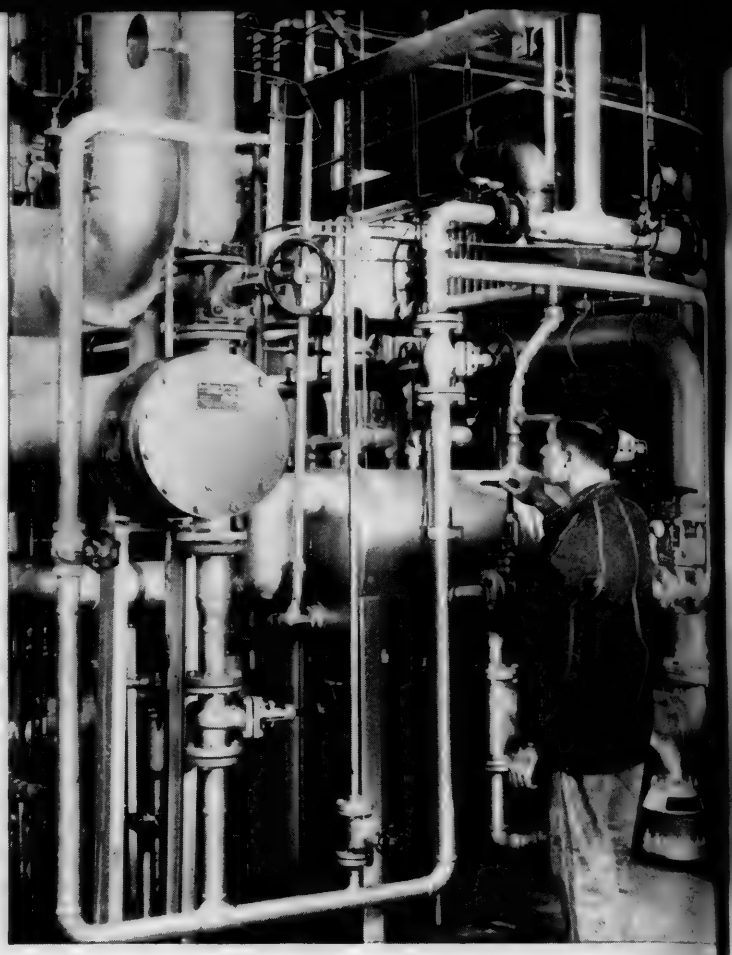
12,000 "TUBE-TURN" PRODUCTS

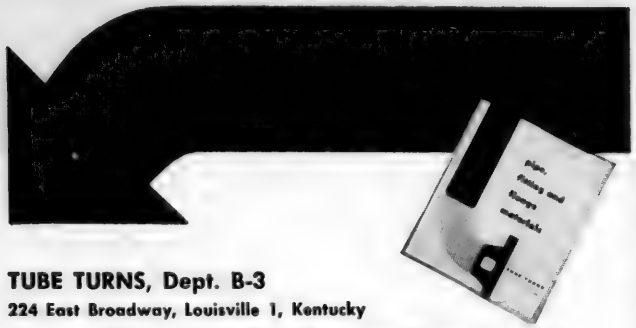
to help you save 3 ways...



SIMPLIFIES ENGINEERING. There's no compromise when you specify TUBE-TURN products. You can count on getting the exact fittings for your project ...the right type, size, schedule and material for every piping service. Shown at right: Aluminum piping with TUBE-TURN Welding Fittings and Flanges, in water purification plant of The General Tire & Rubber Company, Chemical Division, Ashtabula, Ohio.

SPEEDS UP THE JOB. Uniform size, circularity, wall thickness of TUBE-TURN Welding Fittings assure good fit-up and alignment . . . help make piping installation work faster. Each fitting is marked with *complete* specifications for quick, accurate identification. Quartermarked bevels simplify fabrication.

ONE-ORDER PURCHASING. Your nearby Tube Turns' Distributor provides this complete-line service promptly. Hence, you can make *one order* fill all your needs in welding fittings and flanges . . . to cut red tape and save purchasing time.



TUBE TURNS, Dept. B-3
224 East Broadway, Louisville 1, Kentucky

Please send free copy of Pipe, Fitting and Flange Materials.

Company Name _____

Company Address _____

City _____ *Zone* _____ *State* _____

Your Name _____

Position _____

Available from your nearby TUBE TURNS' distributor

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A DIVISION OF NATIONAL CYLINDER GAS COMPANY

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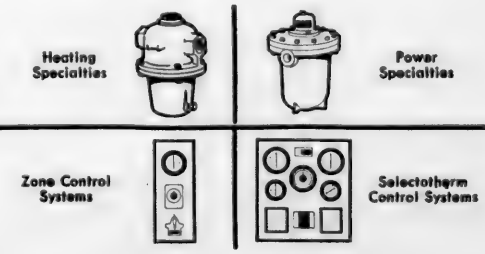
Do You Know of Any Other Steam Trap That Would Have Met <u>This</u> Requirement?

Here is one of nine production lines at Chris-Craft Corporation's Holland, Michigan plant. *Owners were insistent that no part of the building structure or its utilities should extend below the bottom flange of the ceiling beams.* That presented no problem for *Illinois* traps. Their unique design permitted in-line piping to Herman Nelson unit heaters (see inset) which left inches to spare! This guaranteed adequate headroom for boat masts and pulpits.

Also, Illinois traps had an outstanding durability record in prior Chris-Craft construction programs. Versatility and durability—two *good* reasons for specifying Illinois. Select from a complete line—25 inches vacuum to 600 lbs. pressure. Write for Bulletin 110.

illinois ENGINEERING

Illinois Engineering Company
2035 S. Racine Ave., Chicago 8, Ill.
A Division of American Air Filter Company, Inc.



THEY CHANGE THEIR OWN FILTERS-AUTOMATICALLY!

HERMAN NELSON

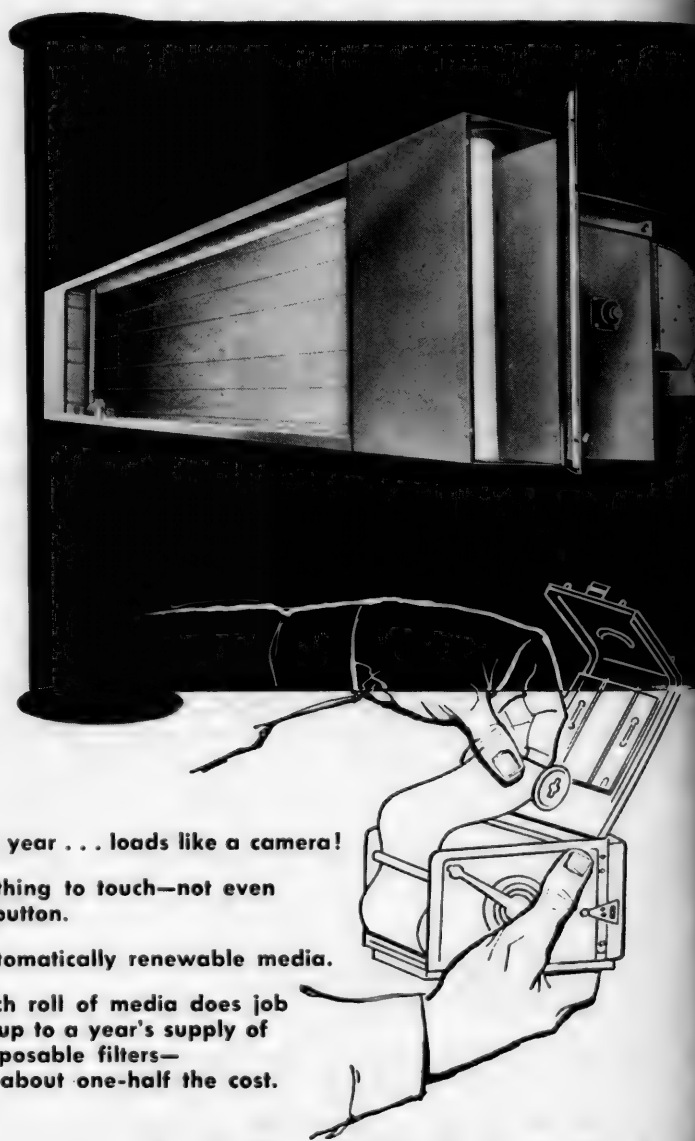
ROLL O VENT

AIR HANDLING UNITS

NEW, COMPLETELY AUTOMATIC IN OPERATION, the exclusive AAF Roll-O-Matic Air Filter Principle is now available on three leading Herman Nelson ROLL-O-VENT air handling units. You simply put the roll of media in the unit—*and forget it*—for up to a year! Operation is completely automatic, and under normal conditions costs just half that of ordinary disposable filters.

You gain maximum filtering efficiency *all year 'round*—with little or no maintenance. There is no reduction of efficiency in the system due to clogged filters. Furthermore, the system is always in balance —air flow *constant*—because clean media is automatically changed at just the right time!

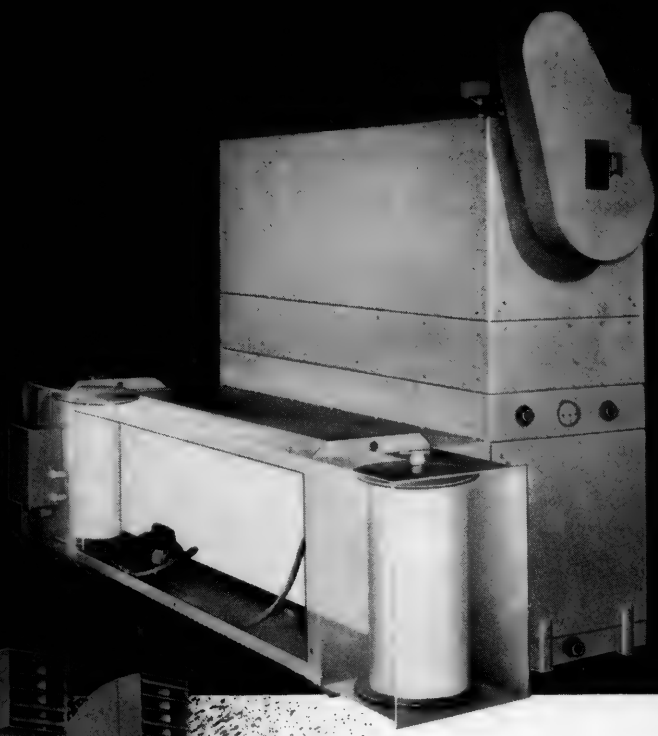
Take advantage of the important time and cost-saving features provided by this exclusive AAF development. Write for full details on "packaged" Herman Nelson ROLL-O-VENT heating, ventilating and cooling units. Ask for fact-filled Bulletin 780. Address Dept. 294.



One roll of media lasts up to a year . . . loads like a camera!

- **Nothing to touch—not even a button.**
- **Automatically renewable media.**
- **Each roll of media does job of up to a year's supply of disposable filters— at about one-half the cost.**

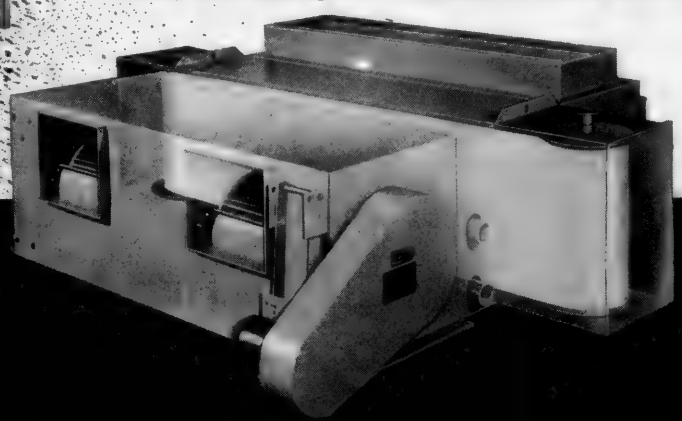
BETTER AIR IS OUR BUSINESS



Herman Nelson
Roll-O-Vent
Air Conditioning Unit — ***IT CHANGES ITS OWN FILTER — AUTOMATICALLY***

Herman Nelson
Roll-O-Vent
Industrial Unit Heater — ***IT CHANGES ITS OWN FILTER — AUTOMATICALLY***

Herman Nelson
Roll-O-Vent
Heating And Ventilating Unit — ***IT CHANGES ITS OWN FILTER — AUTOMATICALLY***



AAF herman nelson

American Air Filter

Company, Inc.
215 Central Avenue • Louisville 8, Kentucky

Control leadership through advanced engineering—research

HONEYWELL ELECTRONIC CONTRO-SI

Gives you flexibility in thermostat location, system functioning—and simplifies system adjustment

WHEN IT comes to performance, no other temperature control system can match the flexibility of Honeywell Electronics.

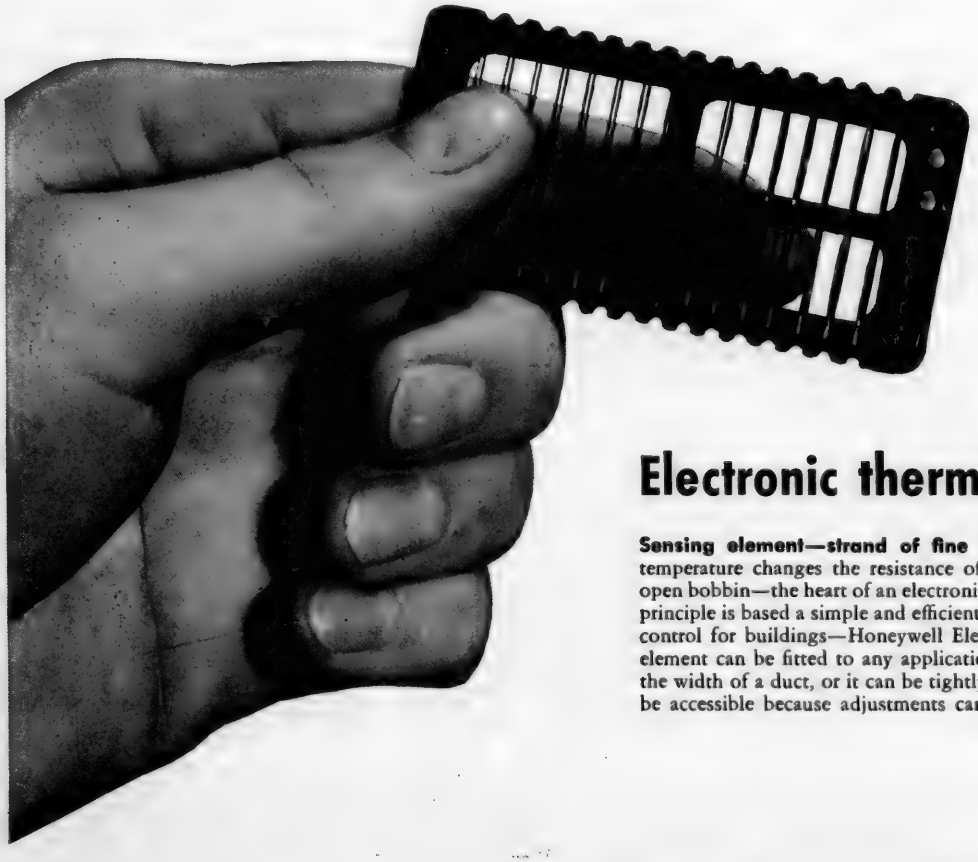
Because the control point and throttling range are unlimited, it is highly adaptable to any building control application.

And because it's *electronic* you can easily and inexpensively use additional thermostats for averaging—or for improved stability and accuracy. An example: the three-thermostat team, one in space, one in discharge air or water, one outdoors. And the faster response of electronic thermostats gives better performance for any client. Also, you can easily tie in electronic master control with pneumatic or electric controls.

When it comes to service, the wonderful simplicity of Honeywell electronic controls becomes readily apparent.

Thermostats, because they have no moving parts, give little trouble, need not be accessible. Checking and adjusting is all done remotely at a panel—electronically.

For complete information on Honeywell Electronic Controls, call your local Honeywell office. Or write direct to Minneapolis-Honeywell, Department HV-6-194, Minneapolis 8, Minnesota.

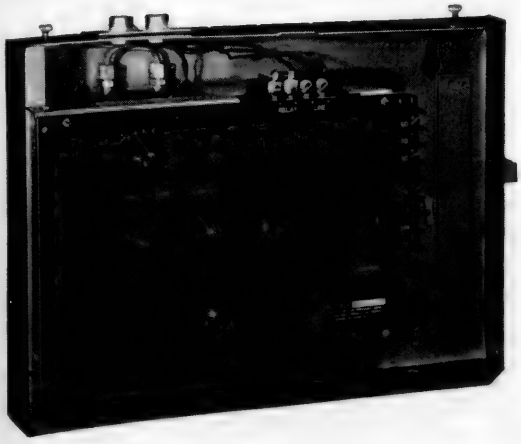


Electronic thermostat

Sensing element—strand of fine wire—A change in temperature changes the resistance of wire wound on an open bobbin—the heart of an electronic thermostat. On this principle is based a simple and efficient form of temperature control for buildings—Honeywell Electronic. The sensing element can be fitted to any application. It can be strung the width of a duct, or it can be tightly coiled. It need not be accessible because adjustments can be made remotely.

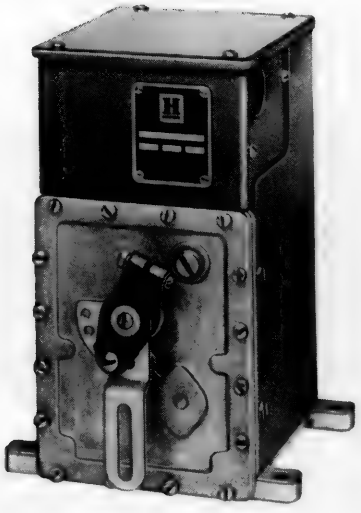
-SIMPLE WAY TO DO A BETTER JOB

Other system components



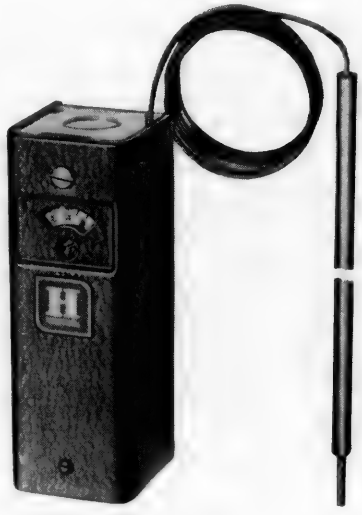
Electro-Pneumatic Relay—RO7902

This unit in conjunction with its electronic thermostats fulfills the function of pneumatic thermostats and puts out a control air pressure from an electronic sensing signal for use in a normal pneumatic control system. The RO7902 brings electronic convenience, accuracy and simplicity to your master-submaster jobs. It ties in the benefits of electronic sensing with your basic pneumatic system. When you replace your pneumatic thermostat with an electronic—and use it with the RO7902—all checking, adjustment and maintenance is done at the panel, eliminating all attention at the thermostat.



Electronic Motor—M7021

This damper or valve motor gives the advantages of an electronic control system without the necessity for a large control panel. Incorporated in the motor are the normal electronic amplifier and panel. It offers most of the advantages of a large control panel, yet is compact and simple. You have the finest, most stable type of control, you save wiring from panel to motor, save cost of mounting panel, save the space needed by a conventional panel. Installation is simple, economical. And the price is lower than if you were to buy a panel and motor separately.



Two-Position Control—L6018

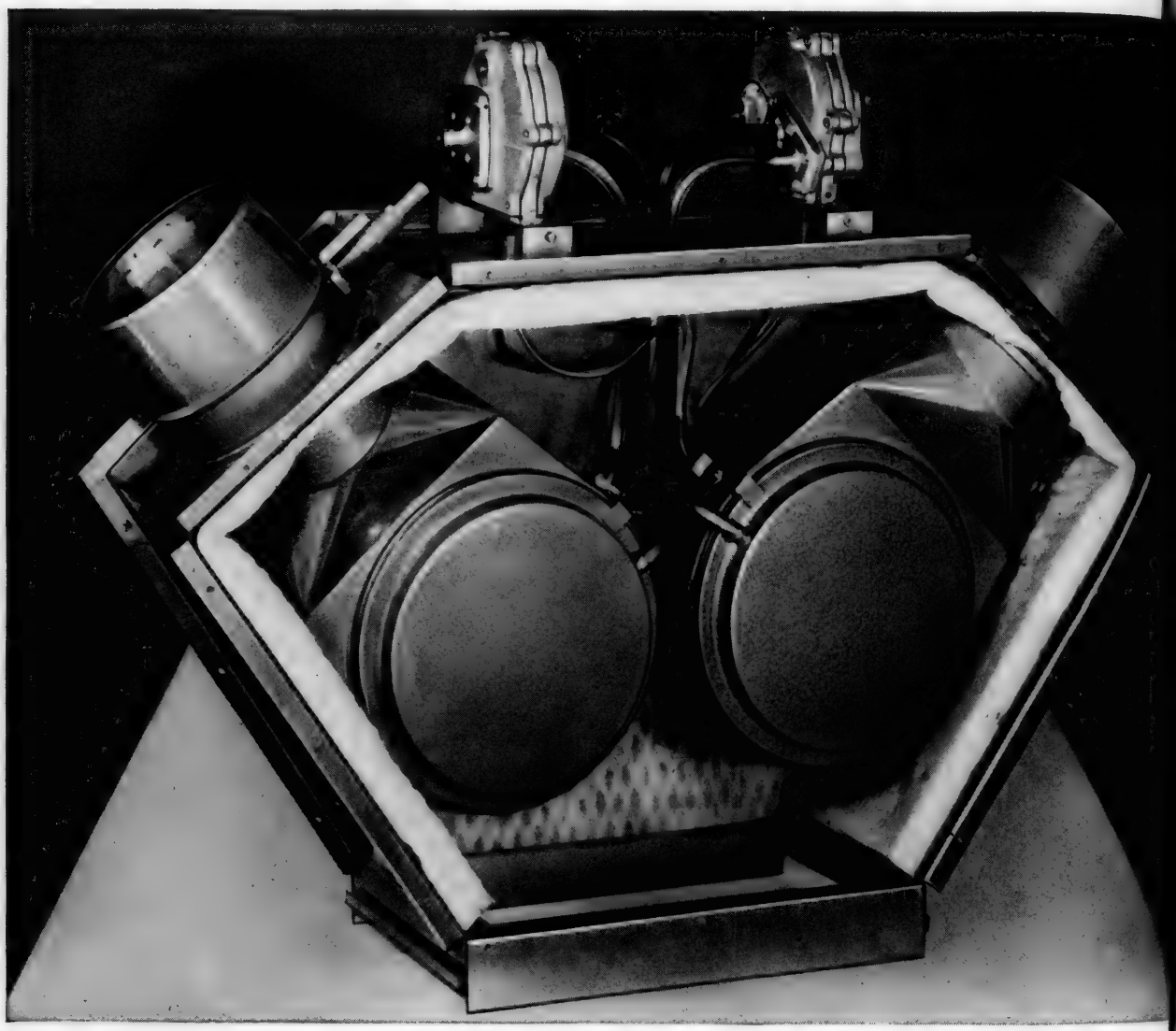
The L6018 is one of a complete line of two-position controls and remote-bulb thermostat controllers for electronic or electric systems. These can be used for many switching functions—like automatic summer-winter changeover of large systems or even individual room conditioners. There are four models of the L6018—A, B, C, D. Each provides a different switching action for various control functions. Together they give an idea of the breadth of the Honeywell line. Controls in this series are low-cost, yet accurate. They are simply built to aid installation and service.

For another big, exciting Honeywell development in building control, turn the page →

Calibrated dial air balancing is the key to the superior performance of the Honeywell High Velocity Air Blender. You adjust dial only once, need never recalibrate again. Once balanced, comfort control is in the hands of the system thermostats.

Dial Air Balancing

NEW HONEYWELL A
HIGH VELOCITY D



Fits any mixing box. The configuration you see here is but one of the many possible for ceiling units. Also, it's now available in nearly every under-the-window type unit. From the new Honeywell Blender you can expect controlled volume of air, constant CFM, long valve life and simplified control. The thermostat in the system controls temperature by controlling the volume of hot air passed by the hot duct. At the same time a flow regulator provides a constant hot air volume for a given thermostat signal under variations in supply duct pressures. A constant total flow is provided by a total flow regulator which operates the cold air valve to make up the difference between hot flow and desired total flow.

Control leadership through advanced engineering—research

AIR BLENDER SOLVES DUAL-DUCT DISTRIBUTION PROBLEMS

Provides constant delivered air volume, needs no recalibration when you add to system

WITH THE new Honeywell Air Blender your clients get the level of comfort they want—on the simple call of the room thermostat.

They get this easily, because the Honeywell Air Blender combines temperature and volume control in one unit.

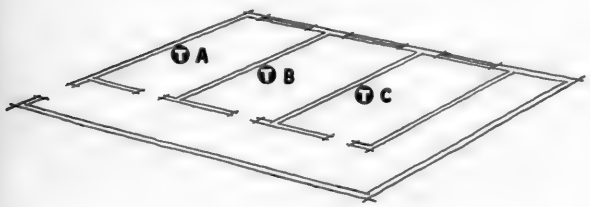
And comfort doesn't come at the expense of some other room. It comes from the system. *One room no longer "robs" another of comfort.*

Besides providing constant delivered air volume, the Honeywell Air Blender takes well to change. With Dial Air Balancing you can add to the system without having to recalibrate distribution points that may be scattered widely—especially valuable in floor by floor modernization or on new construction.

Self-powered, the Honeywell Air Blender uses the pressure of the air it is controlling to actuate the diaphragm—its only moving part. Such simplicity makes possible long life and trouble-free performance.

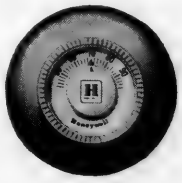
For further information about the Honeywell High Velocity Air Blender and other Honeywell heating and air conditioning products, call your local Honeywell office. Or write to Minneapolis-Honeywell, Dept. HV-6-194, Minneapolis 8, Minnesota.

No room "robs" comfort from another



For the first time in high velocity air handling history you can design a system where adjustment in one room doesn't upset comfort balance in others. Thus, in a typical office, adjustment in area A does not rob comfort from B or C. Neither delivered air volume, nor the ratio of hot to cold air is affected in B or C. This is one of the reasons why it's wise to design with the new Honeywell Air Blender in mind.

The "new" look in thermostats that's appearing on walls of commercial buildings throughout America. New design *inside* gives closer control, vastly superior performance.



Only Honeywell gives you all four—pneumatic, electric, electronic, instruments.

Honeywell

First in Controls

There's only one Roll-O-MATIC AIR FILTER

...because there's only one Roll-O-MAT MEDIA!

...and the media is the filter!

A supposedly "equal" air filter might *look* like the AAF Roll-O-Matic, might conceivably even *operate* like it. But the *dirt-stopping* job is done 100% by the *media, and there's no media anywhere in the world like Roll-O-Mat!*

This fluffy white blanket of bonded glass fibers is the result of dozens of AAF research projects involving radically new methods, completely new materials. Roll-O-Mat compresses to paper-like thinness on the roll and loads into the filter like film in a camera. It's pre-charged with AAF viscosine—an exclusive product specially developed to retain its non-sticky consistency under an extremely wide range of temperature and humidity conditions.

There's no equal to the AAF Roll-O-Matic because there's no equal to Roll-O-Mat media . . . and the media *is* the filter! For complete information, contact your local AAF representative or write direct for Bulletin 248A.

AAF American Air Filter COMPANY, INC.

294 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P.Q.

AAF Dust Control Equipment

Illinois Heating Specialties

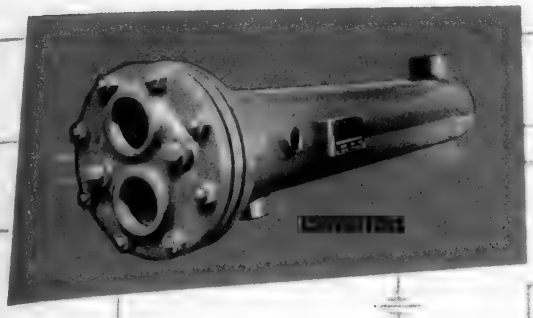
— BETTER AIR IS OUR BUSINESS —

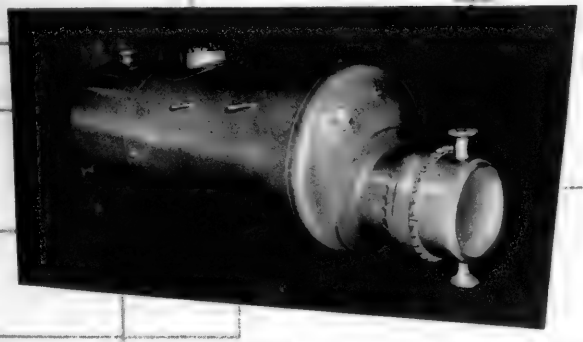
Herman Nelson Unit Heaters

Herman Nelson Unit Ventilators

Paracoil Heat Transfer Equipment

puts HIGH TEMPERATURE HOT WATER to work





Over the years, Paracoil Heat Transfer Equipment has been answering the needs of industry by converting efficiently distributed high temperature hot water to effective local use at serviceable temperatures and pressures.

The Davis Engineering Corporation has pioneered equipment specially designed to make HTHW a practical heat transfer medium. Here are just some of the Paracoil products specified by Consulting Engineers for various service applications.

PARACOIL CONVERTORS FOR:

Space Heating — radiators, radiant heating panels, etc.

Process Heating — vulcanizers, kettles, plastic rolls and platens.

Miscellaneous Heating — snow melting systems, domestic water in storage tanks, electroplating tanks, roof tank heating coils, and wherever hot water is the heating medium.

PARACOIL HEATING ELEMENTS FOR:

Hot Water Storage Tanks — installed in office buildings, laundries, schools, gymnasiums, factories, hospitals, etc.

PARACOIL STEAM GENERATORS FOR:

spot process application, cooking equipment, sterilizers, calender rolls, etc.

PARACOIL FUEL OIL PREHEATING SYSTEMS:

designed to eliminate contamination through isolation of HTHW from the fuel oil.

DAVIS ENGINEERING CORPORATION

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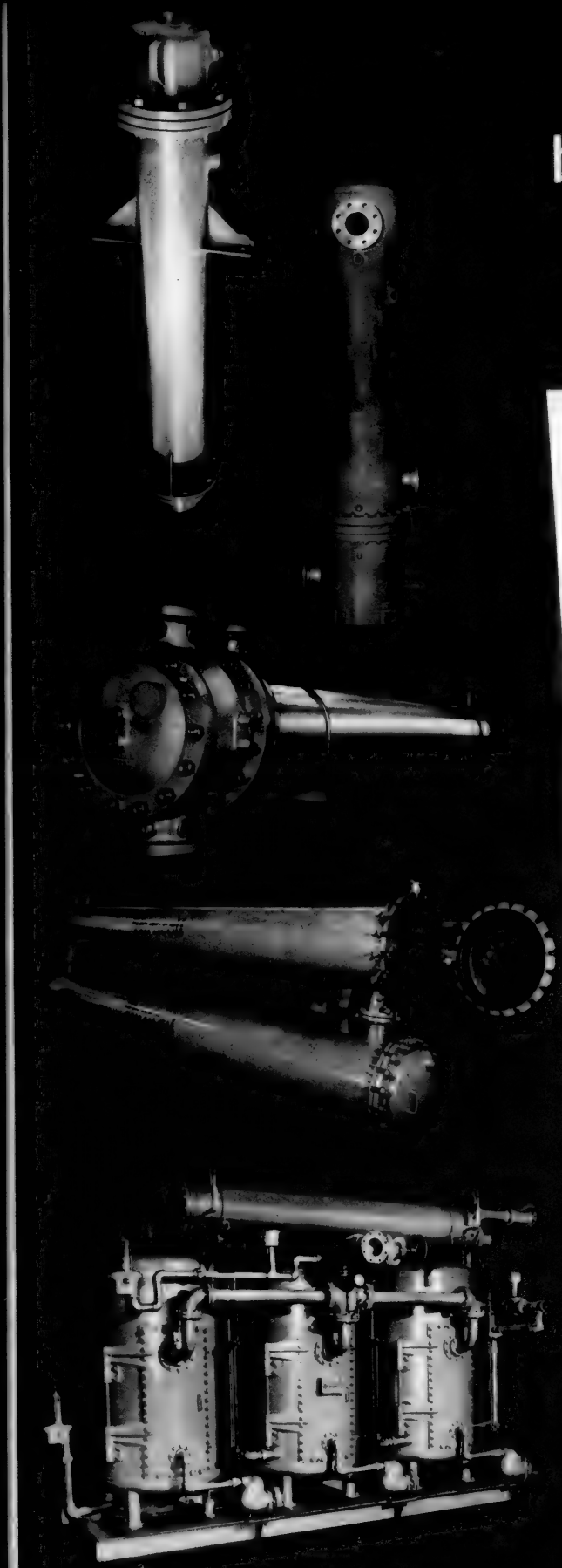

builds a complete line

air heaters and coolers

blowdown exchangers

brine heaters and coolers

boiler coils

chemical process equipment

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freon, reflux, steam, solvent, vent

converters
steam-to-water
water-to-steam

coolers, refrigeration
brine, freon

coolers, industrial
condensate, jacket water
lube oil, quenching oil
boiler-water sample, drain

distilling plants
fresh water; salt water

economizers

evaporators
freon, water distilling, boiler-feed water make-up, contaminated water, fresh-water, salt-water

extractors
grease, boiler feedwater

filters
aerating, distilled water, charcoal, feedwater

flexible nipples

float feed controls

fuel oil heaters
indirect gas-fired Type "GF"
THERMO-FILM safety type
self-cleaning type
straight tube type
suction bell
tank suction type
tubular type
U-tube type

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heating elements

heat reclaimers
open & closed types, laundry

heaters, domestic water
indirect and tankless

heaters, exhaust gas

heaters, feedwater
coil type, standard and improved
straight and U-tube types

heaters, storage tank

heaters, general
acid, alcohol, alkali, water, solvent, process, etc.

instantaneous water heaters

inspection tanks

jacket water coolers

lube oil heaters and coolers

pilot plant equipment

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for reclamation of heat from hot spent liquids

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traps, steam

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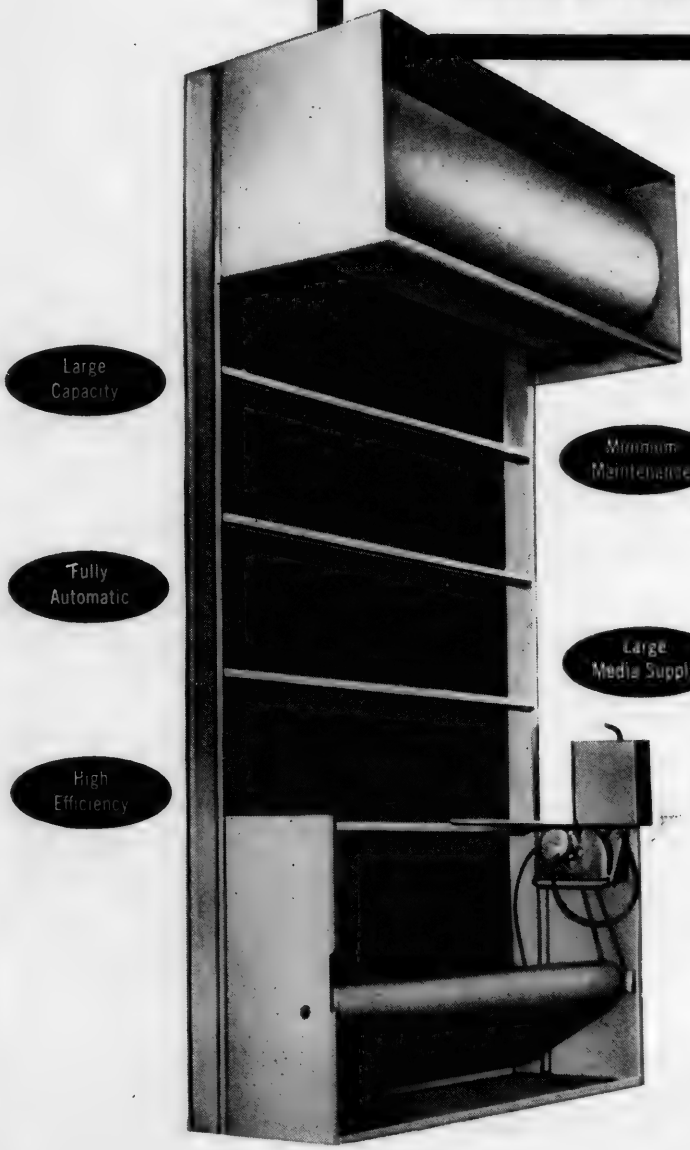
BRAND NEW!

FAR-AIR®

ROLL-KLEEN

automatic DRY FILTER



Here is a new, modern filter that combines fully automatic operation and high efficiency with large dirt holding capacity and minimum maintenance. Engineered for simplicity of operation, the Roll-Kleen offers dependable performance at low operating cost.

HOW IT WORKS

Glass fiber media with an open mesh cloth backing bonded to the downstream side, passes from the top supply roll, over the filtering area support grid, and onto the takeup roll. A preset rise in filter resistance, indicating dirty media, triggers the takeup roll drive to draw clean media completely over the support grid. This complete change-out assures maximum efficiency at all times.

PERFORMANCE

The Roll-Kleen is designed to operate at 350 to 520 fpm face velocity. Efficiency on Standardized Fine Air Cleaner Test Dust is 85% at 520 fpm and 80+% at 350 fpm.

MAINTENANCE

Other than occasional visual inspections, the Roll-Kleen is virtually maintenance-free. Warning lights (which may be located anywhere in your plant) tell when the media is dirt-loaded as well as when the media roll needs replacing.

CONSTRUCTION

Made of the finest quality components, the Roll-Kleen is available in standard widths of 3, 4 and 5 ft. and heights from 5 ft. to 15 ft. Units may be joined together to meet any CFM requirement.

Write for your copy of mechanical comparison bulletin F-105.

FARR COMPANY
LOS ANGELES • NEW YORK • CHICAGO • NEW ORLEANS

Manufacturing Licensees:
Farr Company Mfg. Ltd.
Montreal, Canada
The Clyde Engineering Co. Pty. Ltd.
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Originators of FAR-AIR *Certified Filter Service*

NAESS and MURPHY, *Architects and Engineers, Chicago*
GEORGE A. FULLER CO., *General Contractor*

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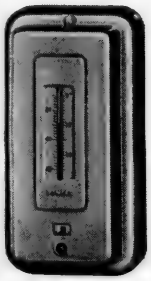
CHICAGO
SUN-TIMES

Modern $15,000,000 building now being erected on the north bank of the Chicago River between Wabash and Rush. It will include a plaza and scenic promenade along the river's edge.

Air Conditioning throughout

America's most modern newspaper plant

will be regulated by a **POWERS** *Automatic temperature and humidity control system*



Symbol of Economy and Quality Control

High speed production of 120,000 newspapers an hour will be aided here by the combination of an outstanding modern building and the latest mechanical equipment designed for maximum efficiency.

In the building's ten acres of air conditioned space, Powers control will play an important role by providing ideal indoor weather for administrative offices, editorial, art, typesetting and engraving departments and pressrooms. Color Printing in close register especially demands the precise temperature and humidity control assured by a Powers system.

If You are Planning a New Building or remodelling an old one, ask your architect to include a Powers Quality system of temperature control. You will help insure utmost comfort and lowest upkeep cost.

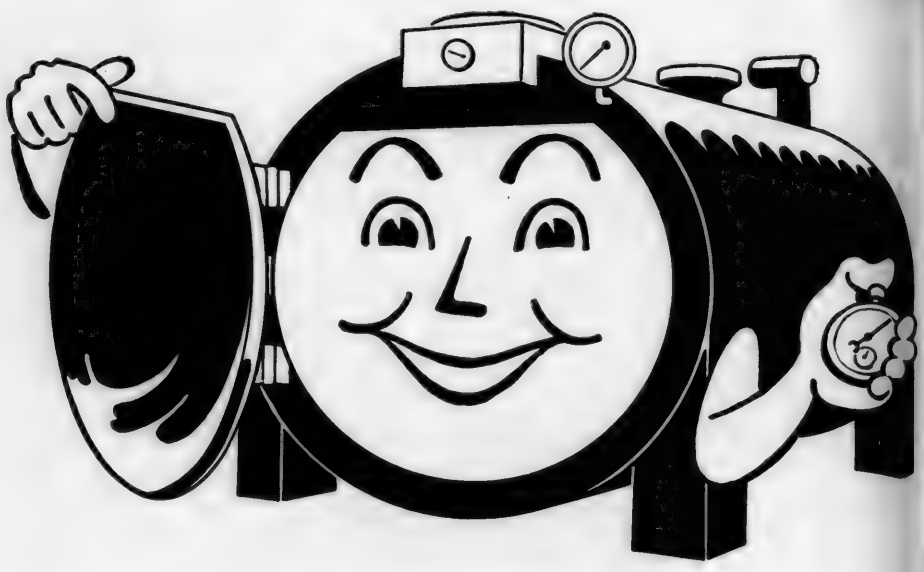
POWERS CONTROL SYSTEMS USED IN
U.S. Capitol • UN General Assembly Hall • New York Times • St. Louis Post Dispatch • Rockefeller Center • Madison Square Garden • New York and Toronto Stock Exchanges • Lever House • Radio City Music Hall • New York City Coliseum (c85)

For further information contact our nearest office

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS | *Offices in Chief Cities in U.S.A. and Canada*

65 Years of Automatic Temperature and Humidity Control



The Boiler that saves maintenance time

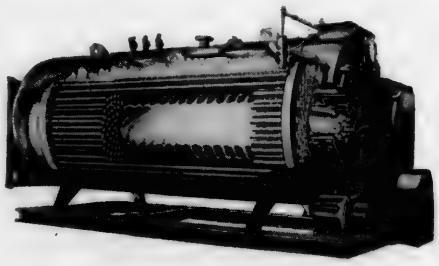
It's always easy to gain access to a Continental Automatic Boiler. For routine servicing, all doors — front, rear, and burner — are hinged. Simplified design eliminates need for refractory baffles or partitions which might burn out, leak, and cause short circuit of gases.

Low maintenance is one of the important cost-saving features of every Continental Automatic Boiler. Controls are simplified and dependable, requiring practically no attention. Heating surfaces stay clean, because of Continental's free, rapid water circulation. And openings are provided to facilitate inspection of steam and water space.

Continental's simple, practical two-pass design with the exclusive "spinning gas" feature means that all return tubes do equal work at equal temperatures, last longer, provide full access to all fire surfaces. And every Continental Automatic Boiler is fire-tested before shipment, to insure a guaranteed efficiency in excess of 80%, and a long, trouble-free, low-maintenance life. For more details, ask for Bulletin BE-3.

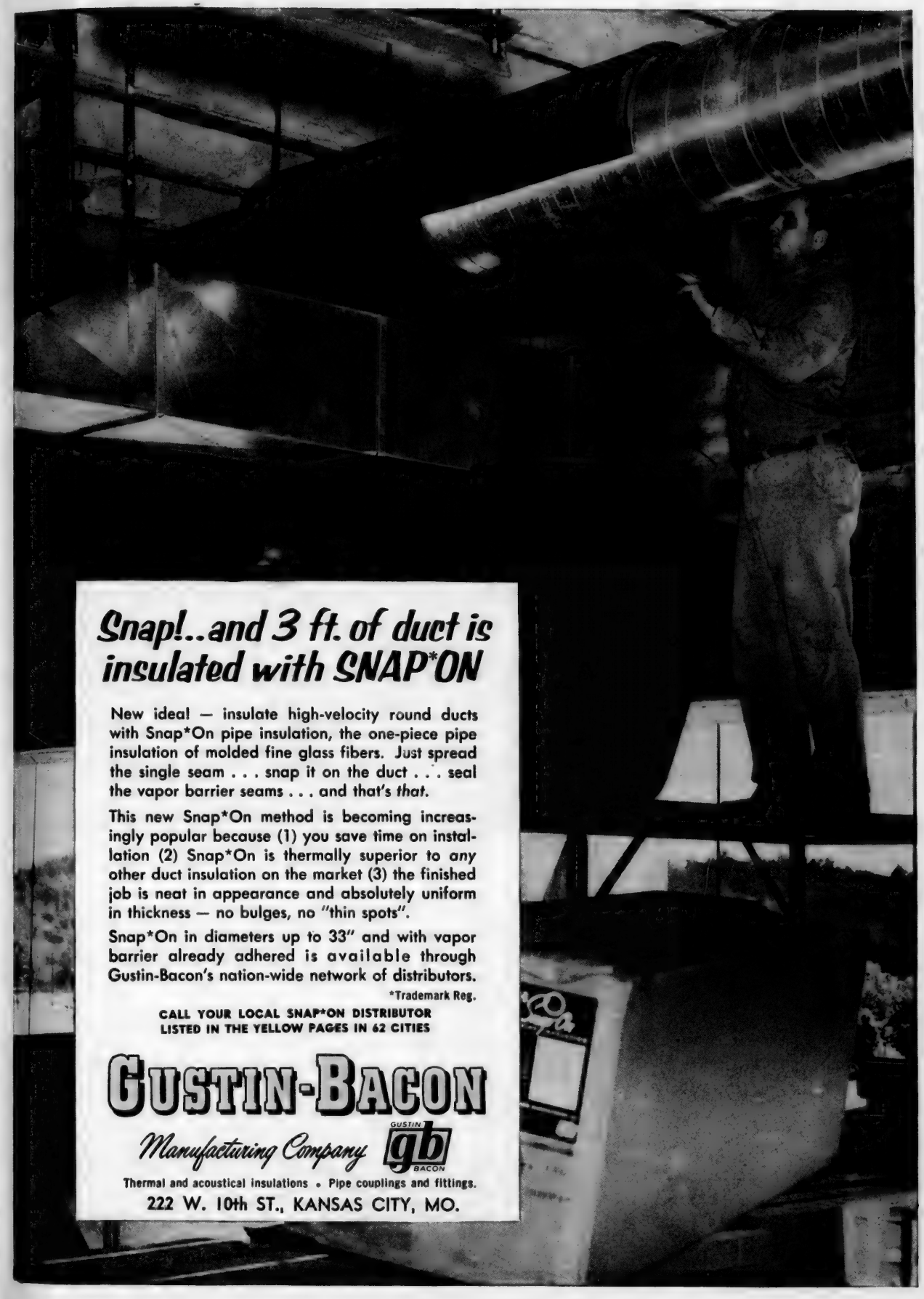
BOILER ENGINEERING & SUPPLY COMPANY, INC.
7 Manavon Street, Phoenixville, Pa.

The **Continental** AUTOMATIC BOILER



Cut-away view of typical Series A Continental Automatic Boiler, firing oil and/or gas.

A HALF CENTURY OF BOILER MANUFACTURING EXPERIENCE



Snap!..and 3 ft. of duct is insulated with SNAP*ON

New idea! — insulate high-velocity round ducts with Snap*On pipe insulation, the one-piece pipe insulation of molded fine glass fibers. Just spread the single seam . . . snap it on the duct . . . seal the vapor barrier seams . . . and that's *that*.

This new Snap*On method is becoming increasingly popular because (1) you save time on installation (2) Snap*On is thermally superior to *any* other duct insulation on the market (3) the finished job is neat in appearance and absolutely uniform in thickness — no bulges, no "thin spots".

Snap*On in diameters up to 33" and with vapor barrier already adhered is available through Gustin-Bacon's nation-wide network of distributors.

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CALL YOUR LOCAL SNAP*ON DISTRIBUTOR LISTED IN THE YELLOW PAGES IN 62 CITIES

GUSTIN-BACON

Manufacturing Company GUSTIN gb BACON

Thermal and acoustical insulations • Pipe coverings and fittings.

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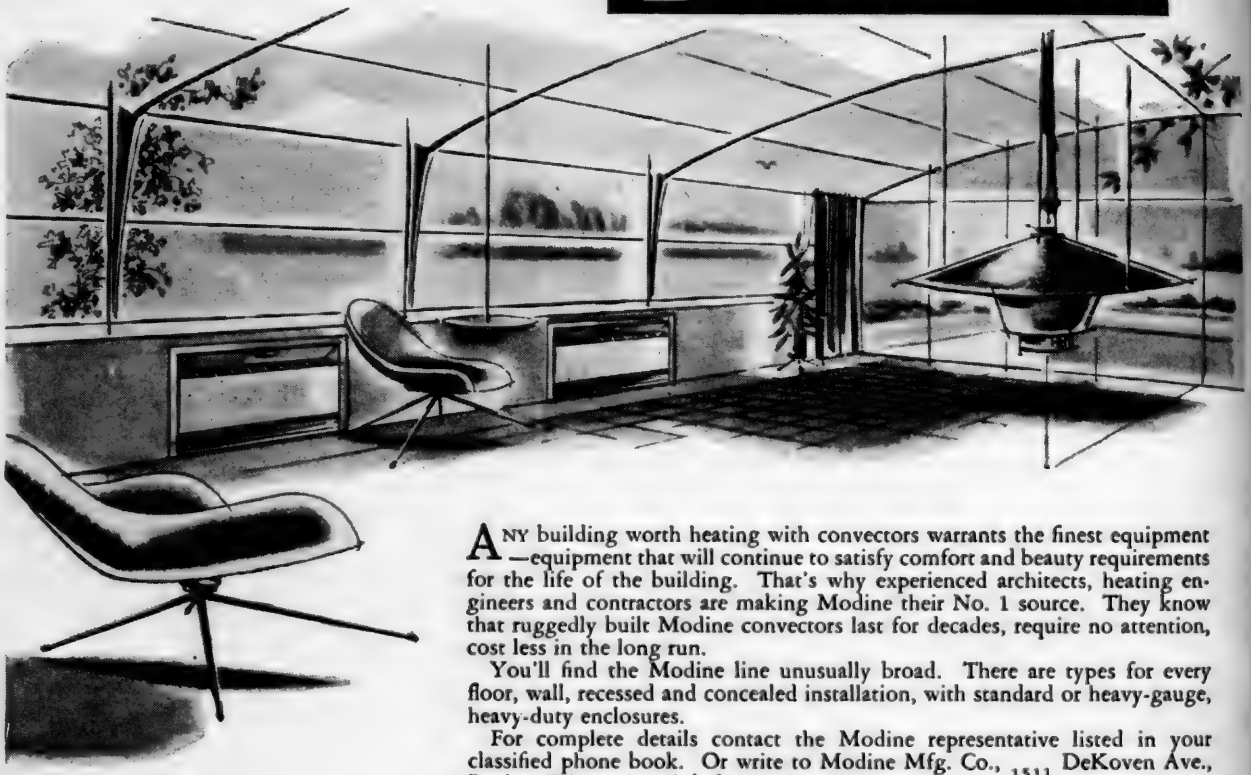
PLAN FOR 1999

with MODINE convector radiation

30 types, 8,000 sizes ...to help you plan for the years ahead

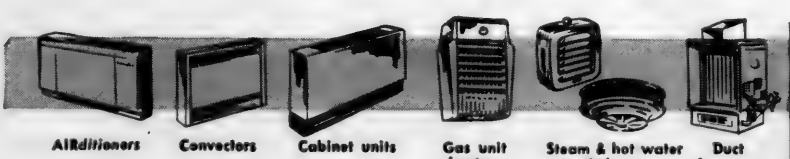


ANY building worth heating with convectors warrants the finest equipment—equipment that will continue to satisfy comfort and beauty requirements for the life of the building. That's why experienced architects, heating engineers and contractors are making Modine their No. 1 source. They know that ruggedly built Modine convectors last for decades, require no attention, cost less in the long run.

You'll find the Modine line unusually broad. There are types for every floor, wall, recessed and concealed installation, with standard or heavy-gauge, heavy-duty enclosures.

For complete details contact the Modine representative listed in your classified phone book. Or write to Modine Mfg. Co., 1511 DeKoven Ave., Racine, Wisconsin. Ask for Catalog 257.

R-1352



AIRditioners | Convectors | Cabinet units | Gas unit heaters | Steam & hot water unit heaters | Duct furnaces

In Canada: Sarco, Ltd., Toronto

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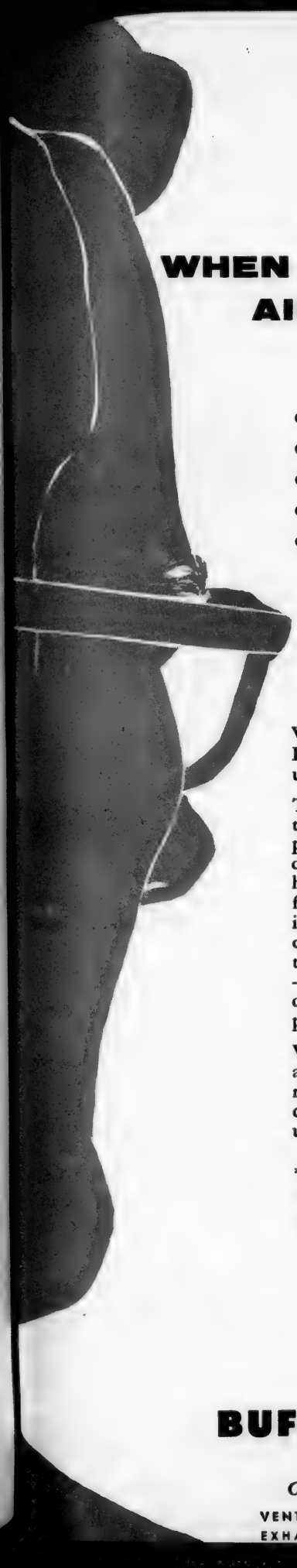


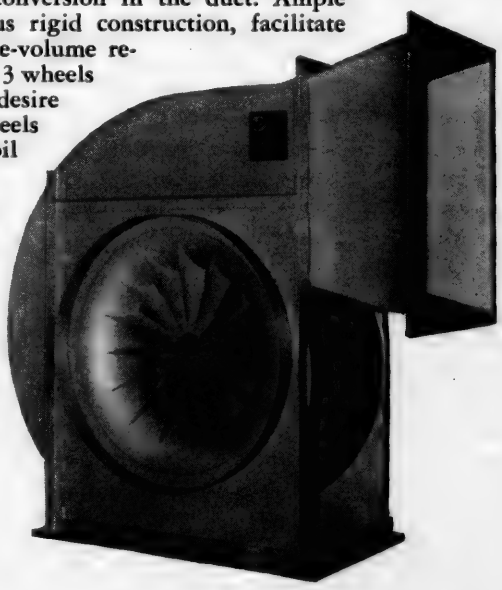
WHEN FACED WITH A HIGH PRESSURE AIR MOVING JOB DEMANDING:

- MAXIMUM EFFICIENCY
- QUIET OPERATION
- SERVICE-FREE PERFORMANCE
- ADAPTABILITY TO VARIABLE INLET CONTROL
- EASE OF INSTALLATION

BUY AND SPECIFY "BUFFALO" AIRFOIL FANS

Where you want the above mentioned qualities in a system calling for Class II or heavier construction, this is the fan that will give complete satisfaction under most conditions.

The 92% mechanical efficiency of the Type "BA" Airfoil is an actual certified test figure, proved out time and again. And advantages don't stop there. Complete streamlining — inlet, wheel flange, wide-channel blades, housing and divergent outlet — provide a new level of quiet, smooth air handling and excellent static conversion in the duct. Ample flanges at inlet and outlet, plus rigid construction, facilitate installation. For various pressure-volume requirements, you have a choice of 3 wheels to deliver the performance you desire — as well as 3 semi-airfoil wheels closely approximating full-airfoil performance at lower cost.



Write today for Bulletin FD106 and check the "Q" Factor* that makes these fans your logical choice when you want the unqualified best in fans.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

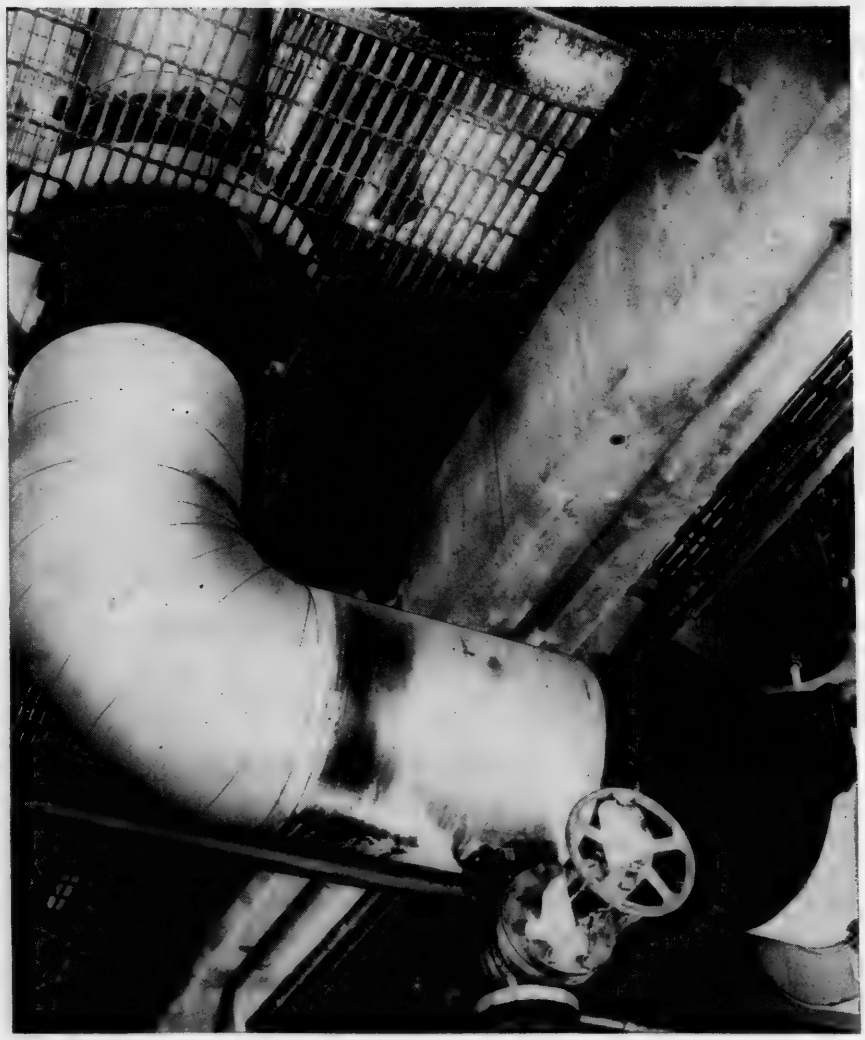
BUFFALO FORGE COMPANY

"Buffalo"

BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT
EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING



THIS IS WHAT

ADSCO

MEANS BY

SPECIAL

JOINTS

The photo shows a small but very important section of an insulated, spring-suspended 8″ pipe line in the new Moundsville, W. Va., plant of the National Aniline Division of Allied Chemical & Dye Corp. At the point shown, the line is subjected to complex stresses which are completely resolved and placed in balance by the ADSCO Gimbal Expansion Joint, upper left, and the ADSCO Hinge Expansion Joint, lower right.

In the Gimbal Joint, two sets of bars are pinned to the octagonal ring at 90° to each other. The other ends of the bars, still at 90° to each other, are pinned to the pipe leading into the joint. Running through the center of the ring, with a slight clearance, is a nipple connecting two expansion elements. This gimbal arrangement permits the joint to absorb 6° of angular movement from two different directions: the left and right motion of the horizontal part of the ell and similar motion from other unseen upper horizontal piping at 90° to the plane of the lower piping.

A partner to the Gimbal Joint and an indispensable part of this piping system is the Hinge Joint shown lower right. This absorbs the angular rotation of the ell caused by the expansion and contraction of the vertical piping.

There are so many motions involved in this section that, under certain conditions, the octagonal ring of the Gimbal Joint could describe a circle. Yet ADSCO and National Aniline engineers were able to identify all the motions and absorb them economically and efficiently by the Gimbal and Hinge Joints.

ADSCO designs and manufactures many types of both standard and special joints for many purposes. Consult ADSCO on any piping problem.

ADSCO DIVISION

YUBA INDUSTRIES, INC.

20 MILBURN ST. BUFFALO 12, N. Y.

ONE PACKAGE "Pre-engineered" AIR CONDITIONING SYSTEM

THE DUNHAM-BUSH 'CPU' COMMERCIAL PACKAGE UNIT

This pre-engineered Dunham-Bush unit is a complete air conditioning ***system*** housed in one cabinet. Each unit is ***entirely self-contained*** . . . with evaporator, compressor, evaporative condenser and pump, fans, motors, piping and controls . . . all ***pre-engineered*** to provide peak operating performance at minimum operating cost. Installation requires only connection of power supply to control panel, connection of water make-up line and necessary duct connections. All units are run in and tested before shipment and are shipped with a holding charge of Freon.

The Dunham-Bush 'CPU' unit features patented high efficiency Inner-Fin® cooling coils; slow speed compressors specially selected for quiet operation; and forced-draft, blow-through type Inner-Fin evaporative condenser. Available in 10, 15, 20, 30 and 40 Ton models.

Get complete details today. Contact the Dunham-Bush Sales Engineer in your area or write for 'CPU' catalog.

Dunham-Bush, Inc.

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Detroit's SHERATON-CADILLAC HOTEL

stays modern with AIRTEMP AIR CONDITIONING

1949—Ballroom air conditioned by Chrysler's Airtemp Division.

1951—First Airtemp cooling added to Parlors and Meeting Rooms.

1954—Modernization of cooling system in Dining Rooms, Bars and Lounges starts with new Airtemp equipment.

1955—500 rooms equipped with Airtemp combination heating and cooling.

1956—Dining Rooms, Bars and Lounges switch completely to new Airtemp cooling.

1957—All remaining guest rooms—554—now receiving Airtemp heating and cooling.

ONE BIG REASON WHY
the Sheraton-Cadillac chooses Airtemp:
"Airtemp has been able to effect savings in both installation and operation."

Airtemp ENGINEERED BY CHRYSLER

—makes Air Conditioning practical for every building project!

Dial "Springtime" Any Time

Airtemp CONSTRUCTION
DIVISION OF CHRYSLER CORPORATION

PHONE your local Airtemp outlet. Let them explain the advantages of Airtemp for *your* next project. Or write to: Airtemp Construction Division, Chrysler Corp., Dayton 1, Ohio.

AIR CONDITIONING OR HEATING FOR A ROOM . . . A HOME . . . A BUSINESS . . . AN AUTOMOBILE

Specify RECO

Skilled RECO craftsman seals head of cement-lined storage heater for Jamestown Festival

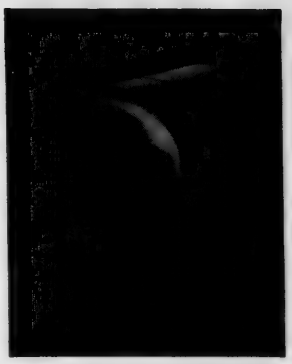
VIRGINIA'S JAMESTOWN FESTIVAL
Architects & Engrs.—Dalton & Justice, Richmond, Va.
Plumbing Contr.—Service Plumbing and Heating Co. Williamsburg, Va.
General Contractor—John W. Daniels, Danville, Va.
Heating & Plumbing Jobber—Noland Co., Inc. Newport News, Va.

RECO Makes Hot Water History at Virginia's Jamestown Festival

More than two million visitors will walk back 350 years through history at the Jamestown Festival celebration of 1957. But they'll never be more than a few steps away from the comforts of today. A RECO cement-lined hot water storage heater keeps plenty of piping hot water always on tap in the festival's group of administrative buildings—the Reception Center, Gift Shops, Restrooms, and Mermaid Tavern. For these same buildings, a RECO convertor supplies hot water for the forced circulation, modular type heating system.

For guaranteed quality, fair price and quick delivery on *your* next heating job—SPECIFY RECO.

Write for free catalogs and name of RECO representative nearest you today: RECO, Dept. P, 7th & Hospital Sts., Richmond 5, Va.



RICHMOND ENGINEERING CO., INC.

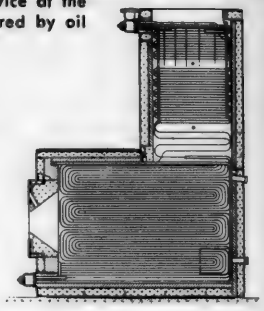
The Cross Company specifies . . .

High temperature water by C-E for heating economy ...low maintenance

The Cross Company, pioneer producer of automation machinery, has recently completed an ultra-modern plant in Fraser, Michigan — practically doubling its former production capacity. After a thorough study of heating requirements . . . and with a view toward further expansion . . . two C-E LaMont Controlled Circulation Hot Water Boilers were specified for the new plant. According to Mr. W. P. Reece, Plant Engineer, "the study indicated that this system would provide the lowest fuel and maintenance costs . . . Experience during this winter confirms the soundness of our decision."

If you are in the market for a heating or process system, it will pay you, too, to investigate high temperature water. Individual needs vary, of course, and both hot water and steam boilers have their place. Our engineers will be pleased to discuss the subject with you or your consultants. Write for our catalog HCC-2.

C E HT Water Boilers in service at the Cross Company. They are fired by oil or natural gas.



Right — One of the 12 million Btu/hr Cross Company boilers. C-E HT Water Boilers are available in sizes from 10- to 300-million Btu per hour; pressures to 500 psi and temperatures to 470F.

Architect's drawing of the new Cross Company plant, Giffels and Vallet, Detroit, Consulting Engineers; Owen S. Lieberg, Associated Consultant.

THESE ARE THE GENERAL ADVANTAGES OF HIGH TEMPERATURE WATER:

1. Higher available heat — many times that of steam at the same pressure.
2. Closer control of temperature.
3. Lower heat loss . . . unused heat returns to the boiler . . . no condensate return lines.
4. No elaborate feedwater treatment . . . make-up requirements are exceptionally low.
5. Steam traps not required . . . trap problems and expense are eliminated.
6. No blowdown losses . . . no safety valve vent losses . . . no condensate losses.

THESE ARE THE SPECIFIC ADVANTAGES OF THE C-E "HT" WATER BOILER:

1. Complete control over circulation in both system and boiler.
2. No separate boiler pump is required, since low pressure loss is inherent.
3. Pressurized operation with oil or gas means no induced draft fan.
4. Single-pass design — no baffles — means cleaner boiler and lower draft loss.
5. Controlled, positive circulation permits more efficient arrangement of heating surfaces.
6. Any fuel — oil, gas, coal, or any combination of fuels.
7. Gastight, welded, steel casing.
8. Fewer headers, all of which are easily accessible.

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CANADA: COMBUSTION ENGINEERING-SUPERHEATER LTD.

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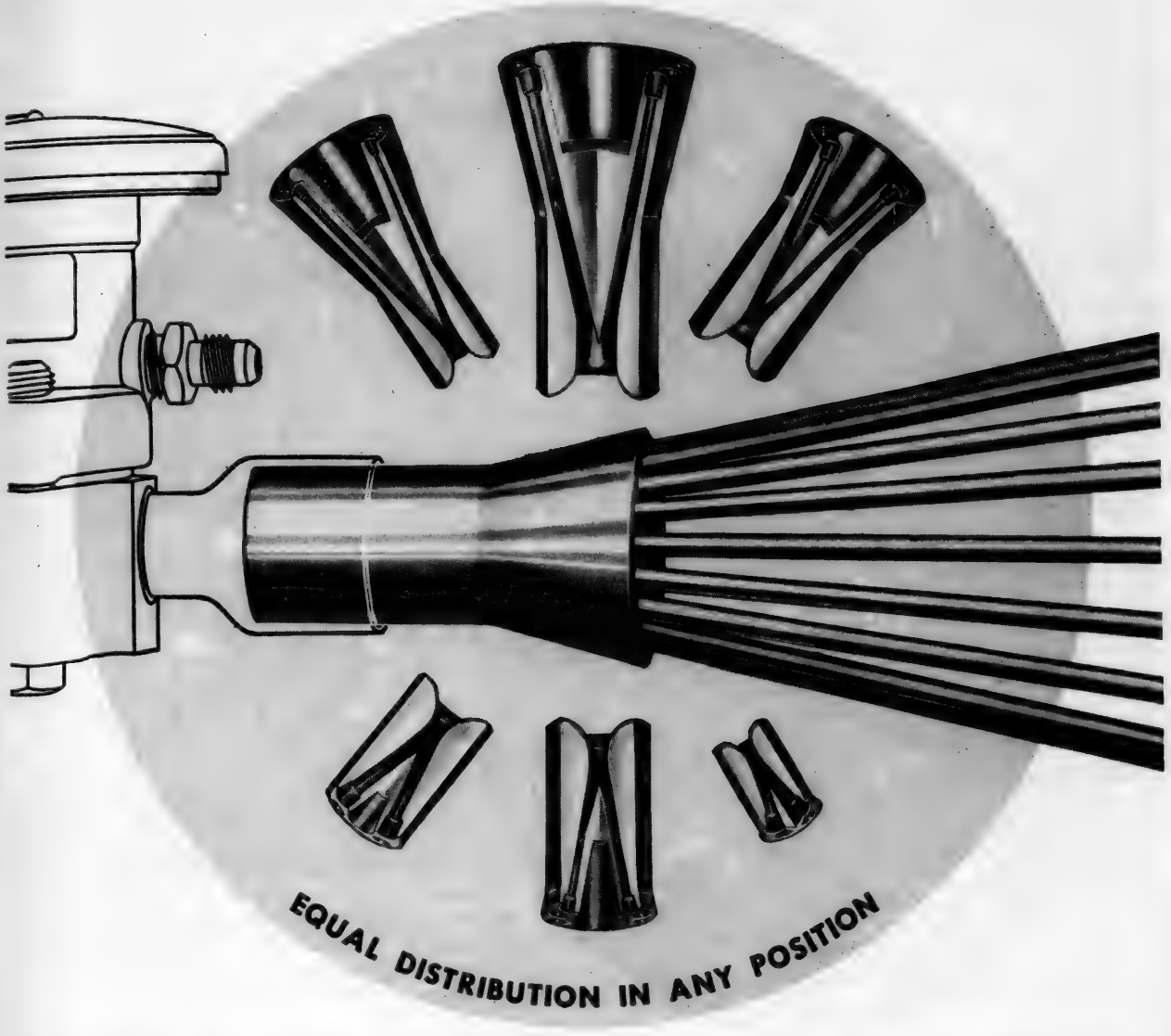
ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE



one-piece ALCO venturi-flo distributor

Low pressure drop—Permits closer, more economical thermo valve sizing.
Wide application range—from 25% of capacity to 150% of rated capacity.
One-piece—No nozzles or orifice plates to stock and install.
One Venturi-Flo replaces distributors requiring as many as 6 or 7 nozzles!
Easy to select—No nozzles to size.

BUY QUALITY—BUY ALCO WRITE FOR BULLETIN 188-55

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IT'S NEW
IT'S DIFFERENT

DETROIT'S V-600 COMBINATION GAS VALVE for CENTRAL HEATING UNITS!

Here is a completely new concept in gas valve design. A design that incorporates a gas valve, pressure regulator and safety pilot in a single, compact and completely integrated unit. A reliable combination valve which will simplify installation and maintenance and save you money.

CHECK THESE V-600 ADVANTAGES

- ✓ UNIQUE DESIGN
- ✓ DEPENDABLE
- ✓ ECONOMICAL TO APPLY
- ✓ GOOD FOR ALL GASES
- ✓ SAFE LIGHTING
- ✓ AVAILABLE FOR 100% SHUT-OFF
- ✓ LARGE CAPACITY . . . UP TO 300,000 B.T.U. PER HOUR

For complete information, write Detroit Controls Division, 5900 Trumbull Avenue, Detroit 8, Michigan.

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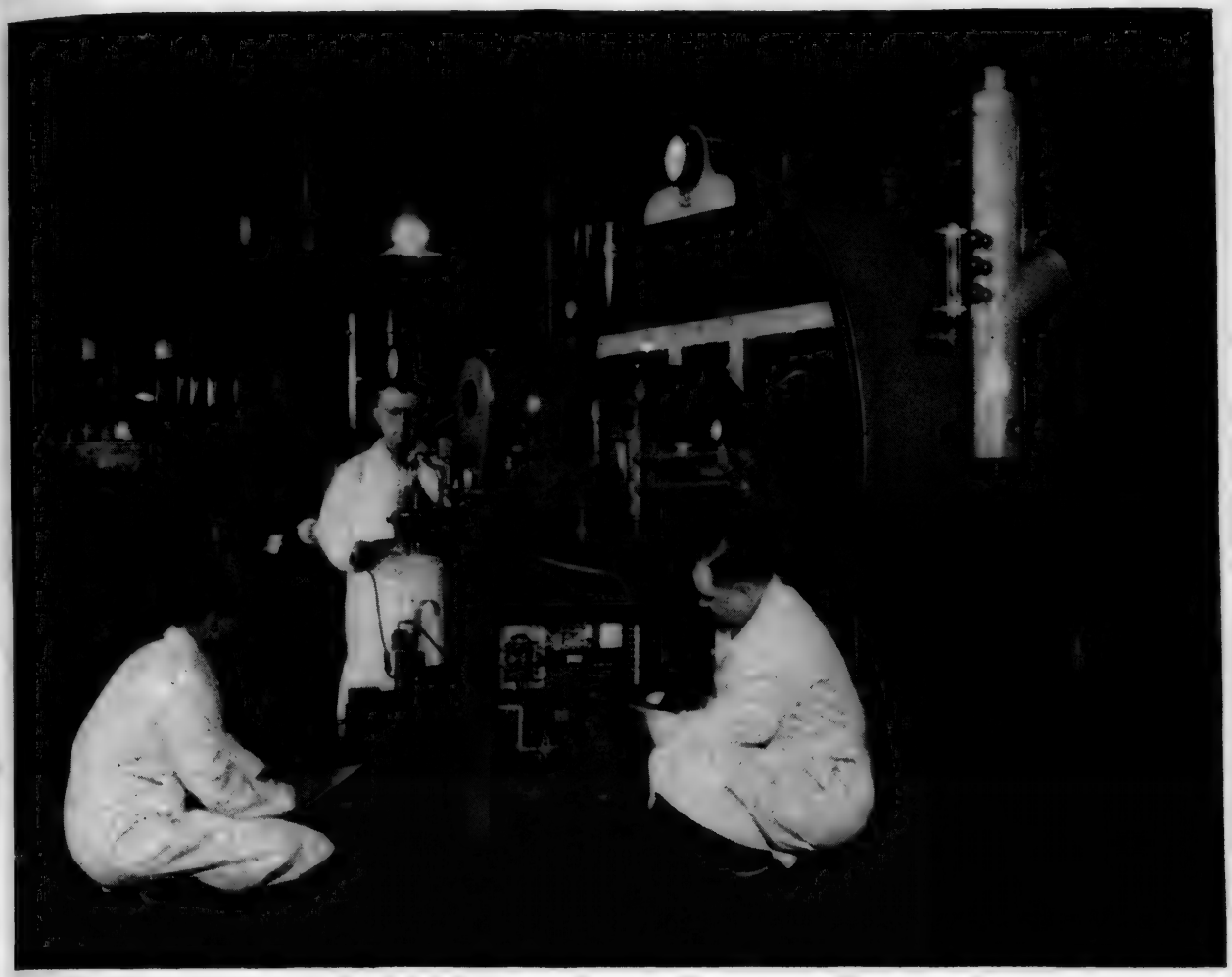
Canadian Representatives: RAILWAY AND ENGINEERING SPECIALTIES LTD., Montreal, Toronto, Winnipeg



factory fire testing . . .

cuts installation costs for Superior Steam Generators

When specifications call for "all equipment installed and left in first class operating condition", it pays to install Superior Steam Generators. Fully integrated units including boiler, burner and controls, with all interconnecting piping and wiring completed at the factory, Superior Steam Generators are ready to go to work as soon as tied in to steam, water, fuel and electric lines.

And there are no "bugs" in Superior Steam Generators. Completely fire tested at the factory before shipment, and started on the job by a factory trained expert, they are your best assurance of a clean, trouble-free installation. For complete details on sizes from 20 to 600 b.h.p. for pressures to 250 p.s.i. or for hot water, write today for Bulletin 819F.

for performance you can **BANK** *on*

SUPERIOR
STEAM GENERATORS

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

Architects: Fisher, Nes, Campbell & Associates; Consulting Engineers: Egli and Gompf, Inc.; Structural Engineer: Van Rensselaer P. Starr; General Contractors: Crow-Bart — William L. Crow Construction Co., and Harry Bart; Mechanical Contractors: The Poole and Kent Co.

This is MONDAWMIN

. . . Baltimore's unique 60-store shopping center where you can buy your groceries, take out an insurance policy, or select a bowling ball in air-conditioned comfort!

Air conditioning is an important tool in merchandising — both for customer comfort and for keeping qualified sales personnel, according to Mondawmin Manager Jerome S. McDermott.

Discussing Mondawmin's air conditioning, left to right: A. J. Simpson, American Blower; A. M. Gompf, consulting engineer; J. S. McDermott, Mondawmin manager; E. R. Kent, mechanical contractor.

How do you air-condition 60 stores, each with its own temperature requirements . . . in half the amount of space usually allocated to an air-conditioning system?

Mondawmin, in Baltimore, Maryland — a compact, two-level shopping center designed for convenience — solved the problem with a unique system built around American Blower Multi-Zone air-conditioning units.

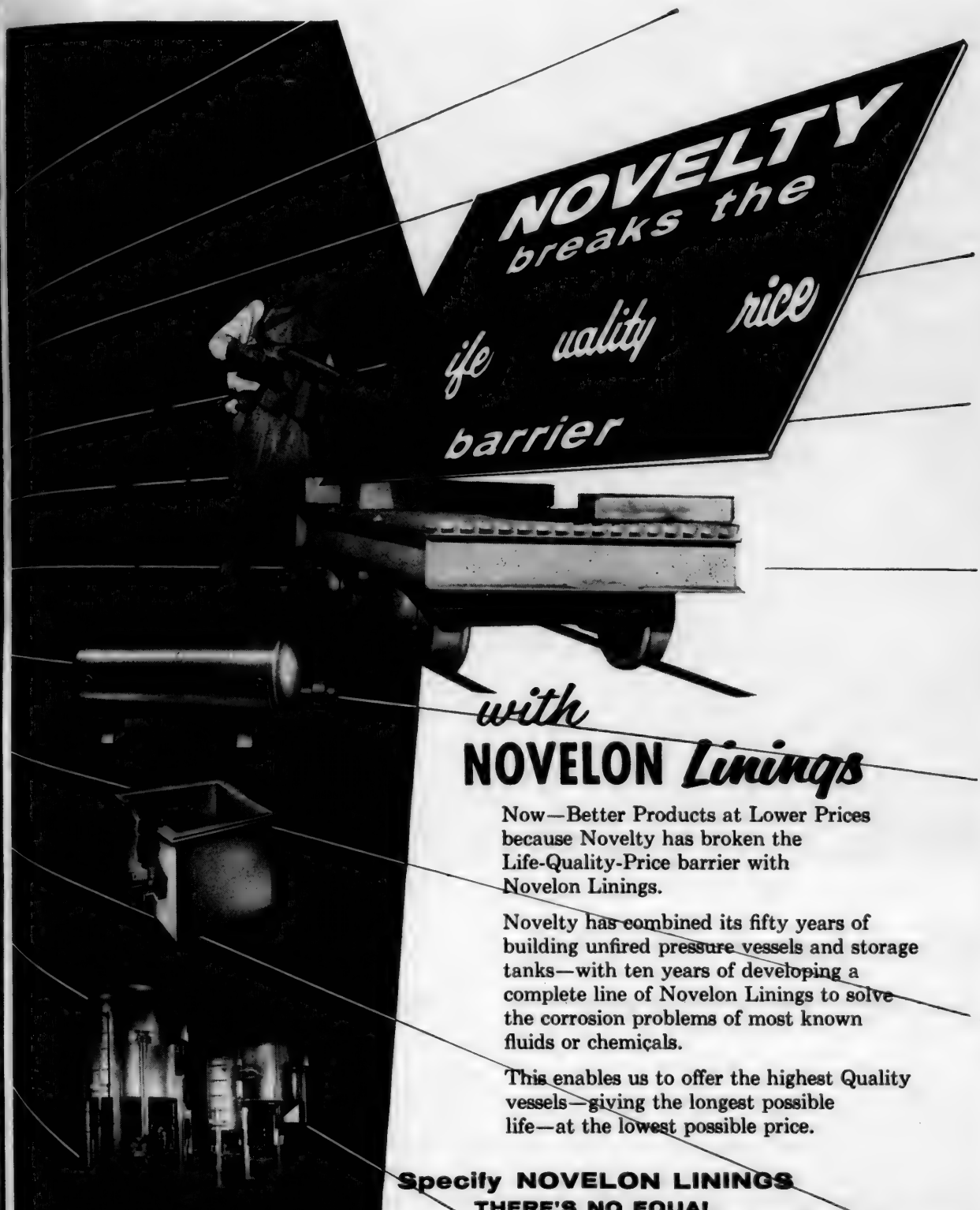
In the words of Mechanical Contractor E. Robert Kent: "By letting each compact Multi-Zone air conditioner serve several stores, we were able to make 10 units act as more than 60 individual pieces of equipment. Thus, every store has its own air-conditioning system, thermostatically controlled and automatically meeting its needs for cool, warm, or fresh air. We knew from experience that the American Blower units would give efficient, trouble-free service. And we were particularly impressed with the personal attention American Blower gave us throughout the project."

If you plan to air-condition, why not ask your architect or engineer about American Blower equipment; or call our nearest branch office. American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

Division of AMERICAN-Standard

AIR-CONDITIONING EQUIPMENT FOR EVERY BUSINESS



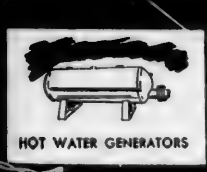
with NOVELON Linings

Now—Better Products at Lower Prices because Novelty has broken the Life-Quality-Price barrier with Novelon Linings.

Novelty has combined its fifty years of building unfired pressure vessels and storage tanks—with ten years of developing a complete line of Novelon Linings to solve the corrosion problems of most known fluids or chemicals.

This enables us to offer the highest Quality vessels—giving the longest possible life—at the lowest possible price.

Specify NOVELON LININGS
THERE'S NO EQUAL


HOT WATER GENERATORS

STORAGE TANKS

SPECIAL LININGS

SPECIAL FABRICATION

Representatives in Major Cities

NOVELTY STEAM BOILER WORKS, INC.
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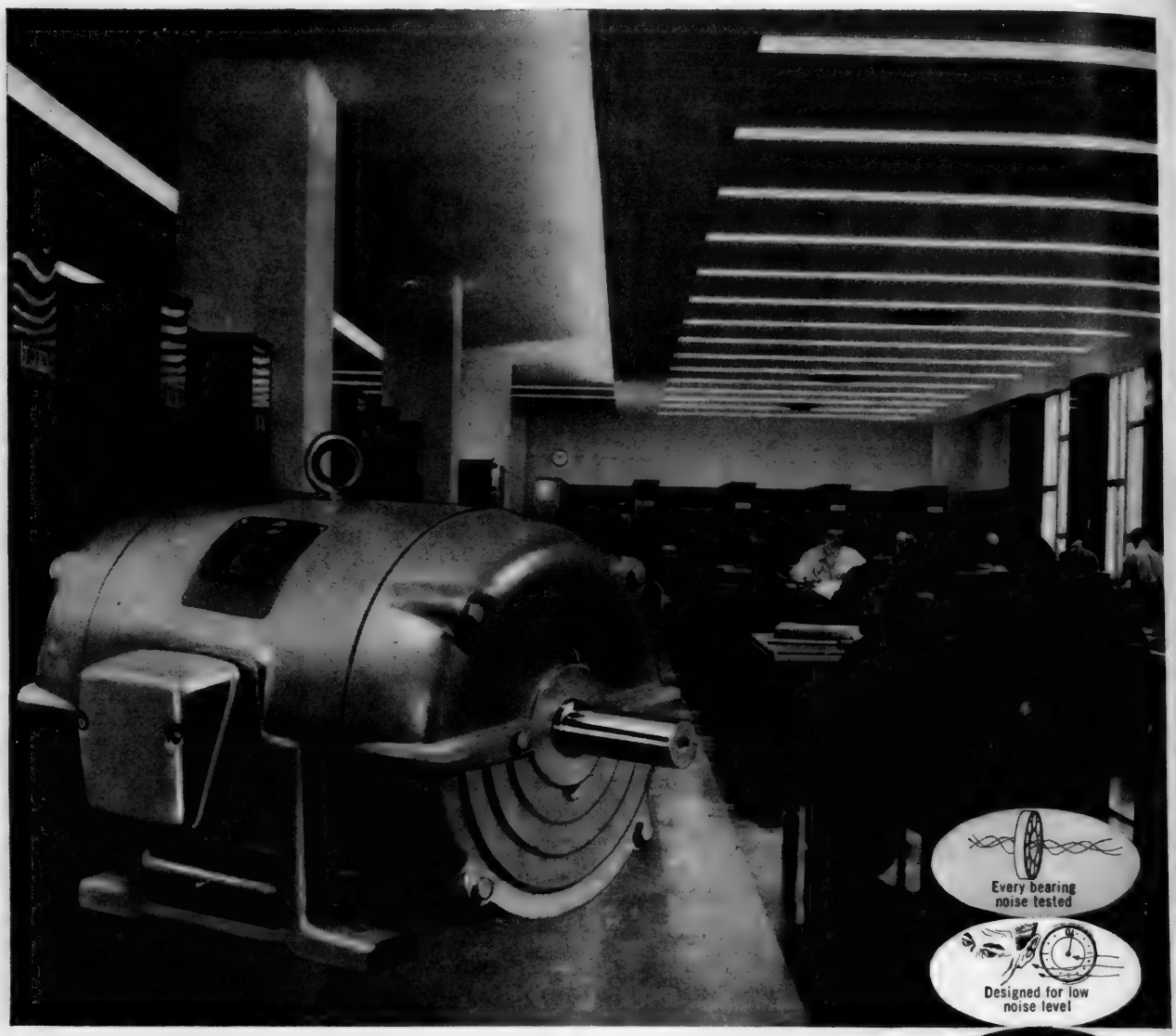


Not even a whisper . . .

Louis Allis motors "hush" air conditioning systems

Cool and quiet . . . ideal for library concentration. And you can assure this combination when you include Louis Allis motors with the built-in "hush" in your air-conditioning equipment.

This silence is golden — for you and your customers. It's vital to systems for hotels, motels, hospitals, and other institutions where quiet comfort is a "must" . . . in offices for increasing employee efficiency.

You'll find that Louis Allis motors are specifically designed for quiet air-conditioning performance. All parts are skillfully made and precisely balanced for silent, vibration-free operation. Housings, bearings, and end brackets are thoroughly tested for quietness. The result: silence — no disturbing resonance during the operation cycle. Part-winding motors are available to reduce starting currents to meet power company requirements.

For more information on this all-important "silent partner" in your air-conditioning business, contact your nearby Louis Allis District Office or write The Louis Allis Co., 454 E. Stewart Street, Milwaukee 1, Wisconsin. Ask for our file-size Bulletin No. 1700.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Jenni Genetron says,

"HERE'S THE RIGHT REFRIGERANT FOR EVERY NEED!"

genetron® SUPER-DRY REFRIGERANTS

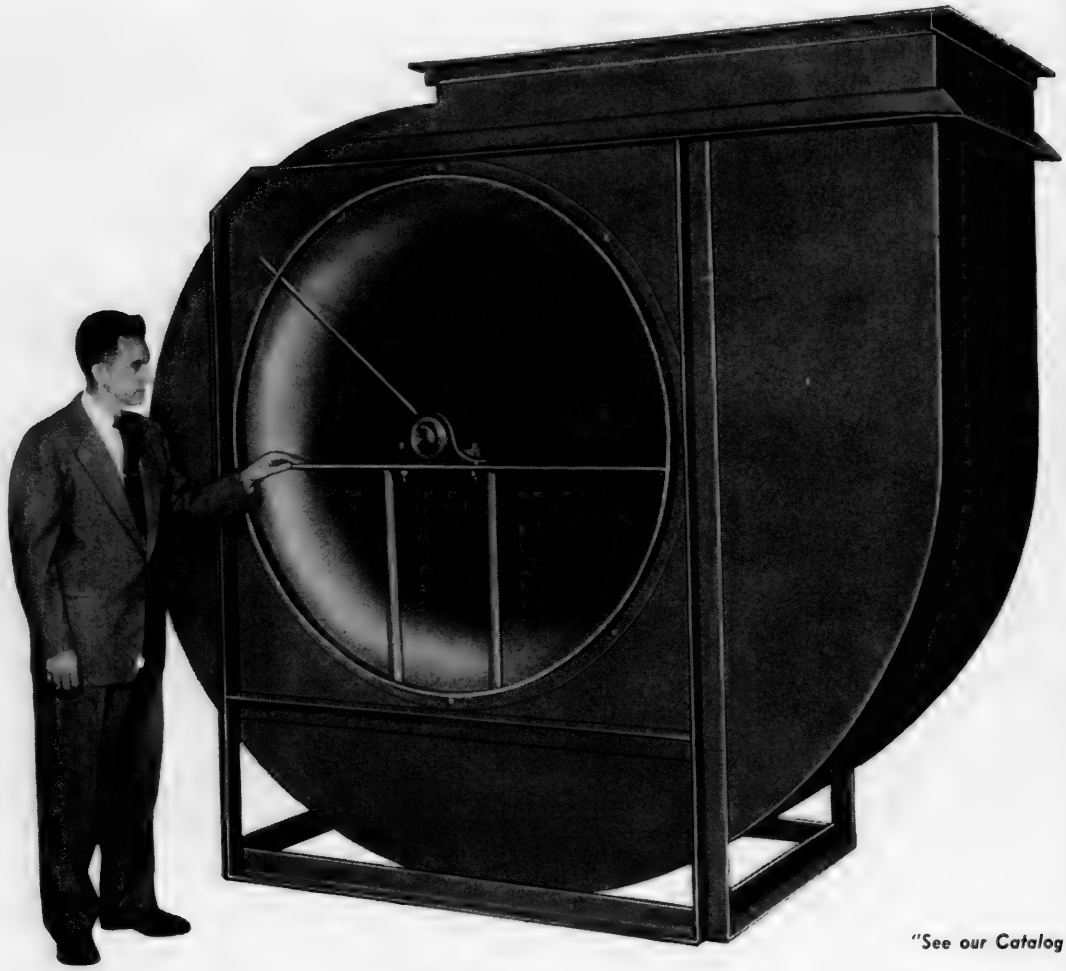
Selected Physical Data
(Performance based on 5°F evaporator temperature and 86°F condenser temperature)

	Trichloromonofluoromethane	Dichlorodifluoromethane	Monochlorodifluoromethane	Trichlorotrifluoroethane	Dichlorotetrafluoroethane
Chemical Formula	CCl_3F	CCl_2F_2	$CHClF_2$	$C_2Cl_3F_3$	$C_2Cl_2F_4$
Molecular Weight	137.4	120.9	86.5	187.4	170.9
Boiling Pt. (°F) at 1 Atm. Pressure	74.7	—21.6	—41.4	117.6	37.6
Evaporator Pressure at 5°F (p.s.i.g.)	24.0*	11.8	28.3	27.9*	15.6*
Condensing Pressure at 86°F (p.s.i.g.)	3.6	93.3	159.8	13.9*	22.7
Freezing Point (°F) at 1 Atm. Pressure	—168	—252	—256	—31	—76
Critical Temperature (°F)	388	234	205	417	294
Critical Pressure (p.s.i. absolute)	635	597	716	495	478
Compressor Discharge Temperature (°F)	112	101	131	86	88
Compression Ratio (86°F/5°F)	6.24	4.08	4.06	8.02	5.33
Specific Volume of Saturated Vapor at 5°F (cu. ft./lb.)	12.27	1.46	1.25	27.04	4.04
Latent Heat of Vaporization at 5°F (B.t.u./lb.)	84.0	68.2	93.6	70.6	60.2
Net Refrig. Effect of Liquid—86°F/5°F (B.t.u./lb.)	67.5	50.0	69.3	53.7	43.0
Specific Heat of Liquid at 86°F (B.t.u./lb.°F)	0.21	0.24	0.34	0.22	0.23
Specific Heat of Vapor at Constant Pressure of 1 Atm. & 86°F (B.t.u./lb.°F)	0.13	0.15	0.15	0.15	0.16
Specific Heat Ratio at 86°F & 1 Atm. (k=Cp/Cv)	1.14	1.14	1.18	1.09	1.01
Coefficient of Performance	5.09	4.70	4.66	4.92	4.60
Horsepower/Ton Refrigeration	0.927	1.002	1.011	0.960	1.025
Refrigerant Circulated/Ton Refrig. (lbs./min.)	2.96	4.00	2.89	3.73	4.65
Liquid Circulated/Ton Refrig. (cu. in./min.)	56.0	85.6	68.0	66.5	88.7
Compressor Displacement/Ton Refrig. (c.f.m.)	36.32	5.83	3.60	100.76	18.78
Toxicity (Underwriters' Laboratories Group No.)	5A	6	5A	4-5	6
Flammability & Explosivity	None	None	None	None	None

*Inches of mercury vacuum.

COMPARE! Careful control at every step in the manufacture of "Genetron" Super-Dry Refrigerants results in products of highest purity, which are extremely low in moisture content and other undesirable impurities. Quality of current production consistently *surpasses* the rigid manufacturing specifications for these products. Write for important informative folder "Genetron Super-Dry Refrigerants."

SEE YOUR WHOLESALER
or write or call
genetron DEPARTMENT
GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.



"See our Catalog in Sweets"

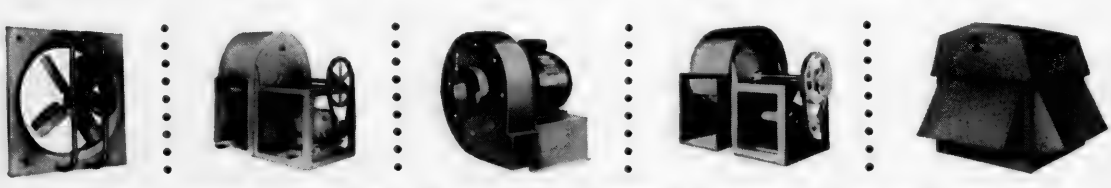
BIG BLOWERS ARE BIG BUSINESS WITH PEERLESS

QUIET! • TROUBLE-FREE! • DEPENDABLE! • HEAVY DUTY! • GUARANTEED!

Versatility in size, application, and engineering has always been a Peerless strong point. Peerless builds its own motors and matches them to the specified blower requirements. Peerless blower frames and housings are usually heavier than any competitive products. Result—a quiet, vibration-free unit.

These are not "off-the-shelf" units, but built to customer rotation and discharge specifications. Each one receives 100% inspection before it leaves the Peerless factory. Each unit is built to NAFM standards. Motors are built to NEMA standards. Each unit is ready for operation when received at the installation site.

A COMPLETE LINE OF AIR MOVING EQUIPMENT



Charter Member of the Air Moving and Conditioning Association, Inc. (AMCA)

Peerless Electric

FAN AND BLOWER DIVISION

THE *Peerless Electric*® COMPANY

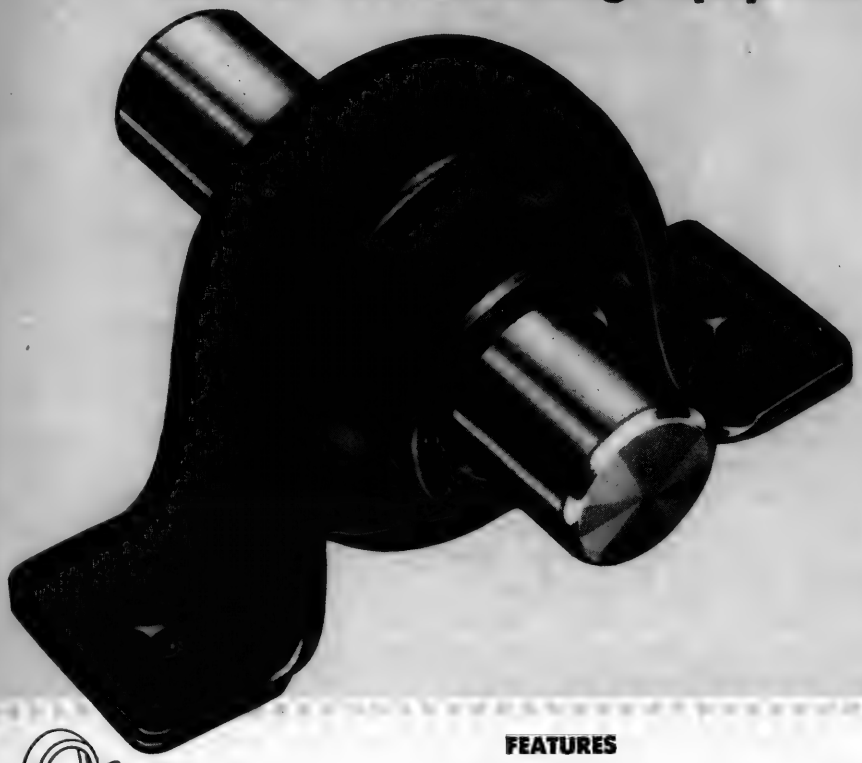
1400 W. MARKET ST. • WARREN, OHIO

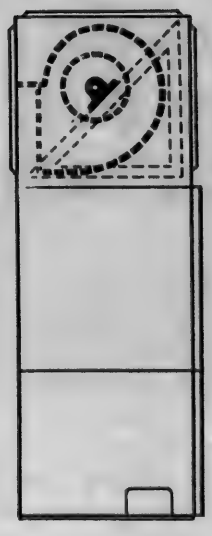
FANS • BLOWERS • ELECTRIC MOTORS • ELECTRONIC EQUIPMENT

Write Today for Bulletins SDA-220, SDA-200 and SDA-160.

Here's an Economical and Efficient Improvement

for Air Conditioning Equipment . . .





FEATURES

Two-piece, pressed steel housing . . . occupies less space than similar pillow block housings.

Precision ball bearing, Fafnir Extended Inner Ring Type, offers extra wide bearing surface on shaft. Balls and races are finished for super-quiet performance.

Self-locking bearing collar of counterbored, mated-cam construction. Needs no lock washers, adapters, or other positioning devices.

Plya-Seals provide positive retention of lubricant and complete protection against contaminants. Special lubricant pre-packed at factory contributes to quietness of operation.

Thick, electric-current-conducting rubber interliner eliminates the need for metallic grounding springs or clips.

Six-page bulletin on all Fafnir Air Conditioning Units provides detailed information including dimensions and load ratings.

Specifically designed for air conditioning units with fan shafts up to an inch in diameter, the Fafnir RPB Type Ball Bearing Pillow Block offers an inexpensive way to improve performance, increase sales appeal. It has been adopted as standard equipment by several manufacturers. Actual installations are demonstrating its advantages.

Next to super-quiet, trouble-free performance, manufacturers are most impressed with the easy installation of RPB units. The bearing slip-fits onto shaft and is positively locked to it by a quarter turn of the famous Fafnir self-locking collar. The housing is installed with two bolts. It affords unrestricted initial alignment in all directions. For more information on the RPB unit and other Fafnir super-quiet ball bearing units designed specifically for air conditioning and heating equipment, write The Fafnir Bearing Company, New Britain, Connecticut.

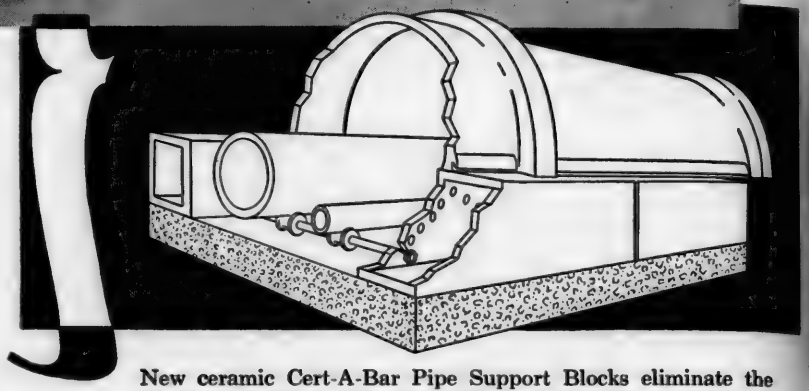
FAFNIR

BALL BEARINGS

MOST COMPLETE LINE IN AMERICA

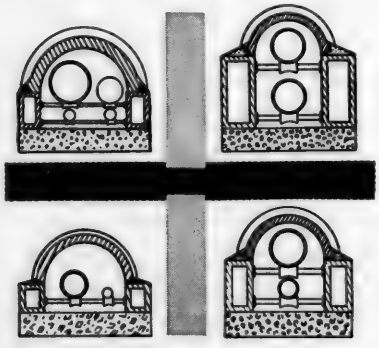
PERMANENT PROTECTION
for underground piping!

STILLWATER CERT-A-BAR* TUNNEL CONDUIT SYSTEM



New ceramic Cert-A-Bar Pipe Support Blocks eliminate the need for interior cast iron rests. The perforated block is laid as a structural support member at regular intervals, and the bars are simply inserted and locked in place.

THE vital consideration in selecting an underground conduit system is *permanent* protection . . . not for one year or five, *but for the life of the piping.* You get the best possible protection for your underground metal service piping with a Stillwater Conduit System of vitrified clay. It's chemically inert—can't rust, rot, corrode, or decay . . . ever. And it is manufactured in accordance with ASTM specification C-13-54, assuring proper strength and quality. Any combination of service piping can be protected. Conduit is available in a wide range of sizes, with a complete line of fittings and accessories, including alignment guides, lateral guides, and anchors. Any contractor's crew can handle the installation easily, or if you prefer, Stillwater Licensed Installers will assume the responsibility. The Cert-A-Bar Tunnel System can be installed with any of three suggested new waterproofing specifications —one for average conditions, one for intermittent ground water conditions, and a third for high water table conditions. It's the lowest-cost conduit per year of service that you can specify or install!



THE CERT-A-BAR SYSTEM HAS ALL THESE IMPORTANT ADVANTAGES

- Inherent structural strength for permanent protection
- Complete flexibility for design
- Minimum initial and long-term costs
- Quickly installed
- Keeps pipe insulation dry
- No electrolytic corrosion of piping
- No maintenance required

A few of the hundreds of possible combinations of piping for the Cert-A-Bar Tunnel System are shown at left.

WRITE FOR

illustrated, four-page circular with complete installation specifications.

*T.M. Reg. App. For. Patents Pending

The Stillwater Clay Products Co.
STILLWATER CONDUIT DIVISION
3334D PROSPECT AVENUE, CLEVELAND 15, OHIO

STILLWATER CONDUIT SYSTEMS

But it takes more than a sign to stop low water . . .

. . . and the hazards that can accompany a low water condition in both a steam and hot water heating boiler.

We are all agreed that our schools must be made as safe as possible. With schools so crowded today and facilities overtaxed, there is greater need for vigilance than ever before.

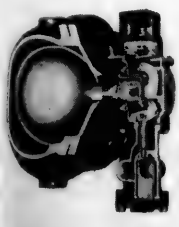
One thing you can do is to see that the boiler water line is under the endless vigil of McDonnell boiler water level controls. Low water can strike anywhere, for any of a score or more reasons, bringing with it the threat of serious and costly damage. And make no mistake about this: Low water is just as much of a possibility in hot water boilers as in steam boilers.

For the average school heating boiler, McDonnell Feeder Cut-off Combinations are a simple, time-proved answer. They add water automatically when needed to maintain a safe water level in the boiler, then stand by to stop the burner if any emergency condition drops the water line to a dangerous level. There is nothing better available for the vital task of protecting a boiler against hazardous low water.

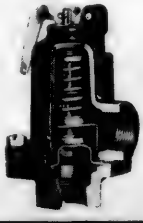
Right now is the time to act. Your local school board must rely on you to bring it to their attention. You'll be doing your community even a bigger favor than you do yourself.

McDONNELL & MILLER, *Inc.*, 3500 N. Spaulding Ave., Chicago 18, Ill.

Doing One Thing Well



No. 51-2, the Boiler Water Feeder and Low Water Cut-off combination that fits most school jobs. For steam and hot water space heating boilers. Other combinations to fit all boilers.

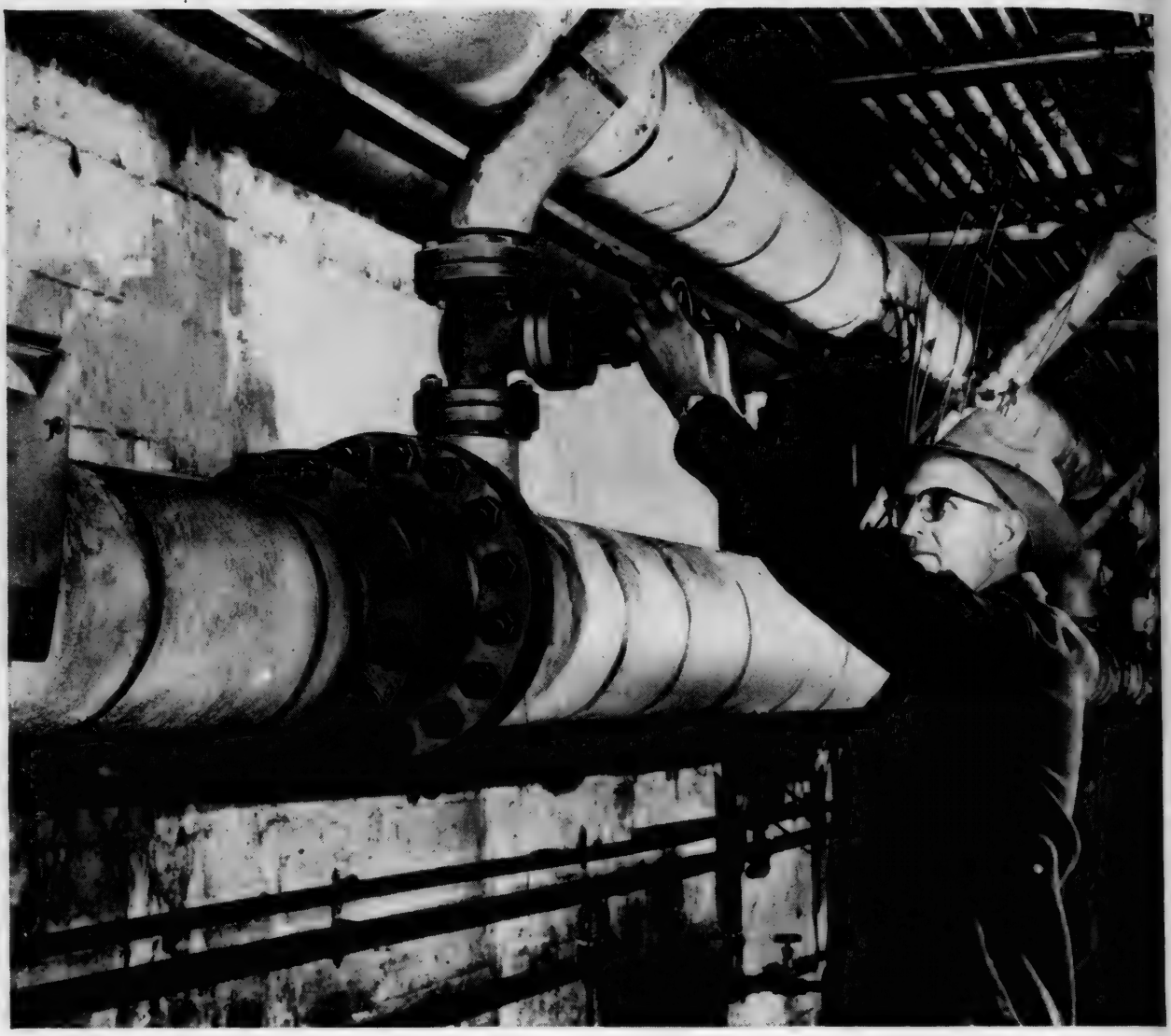


230 Series Pressure Relief Valves for hot water space heating boilers. Meet ASME Boiler Code in every respect; rated and certified by the National Board.

No. 150 Pump Control, Cut-off and Alarm Switch. For boilers up to 150 lbs. The most widely used, time-proved control of its type. Also available with integral water column, as No. 157.

McDONNELL *Boiler Water Level Controls*

Crane Valves Prove Their Value on Steam Service



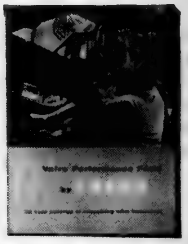
Out-slugs steam for 34 years!

Valve records like this can point the way to lower piping maintenance costs in your own plant!

Here you see a Crane 175-pound Ferrosteel gate valve with 34 cost-free years on 80 psi. steam service—one of a 40-valve installation made in 1923 at Long-Bell Division of International Paper Company, at Longview, Wash.

In all that time, only one of the original 40 valves has been replaced. More important, 39 of the original valves . . . and the replacement . . . are still giving dependable control of steam to kilns—with no more than routine stuffing box maintenance since installation in 1923.

Be sure *your* operation gets low-cost valve service: insist on Crane valves and fittings, from the big, complete Crane line—first choice of industry for over a century.



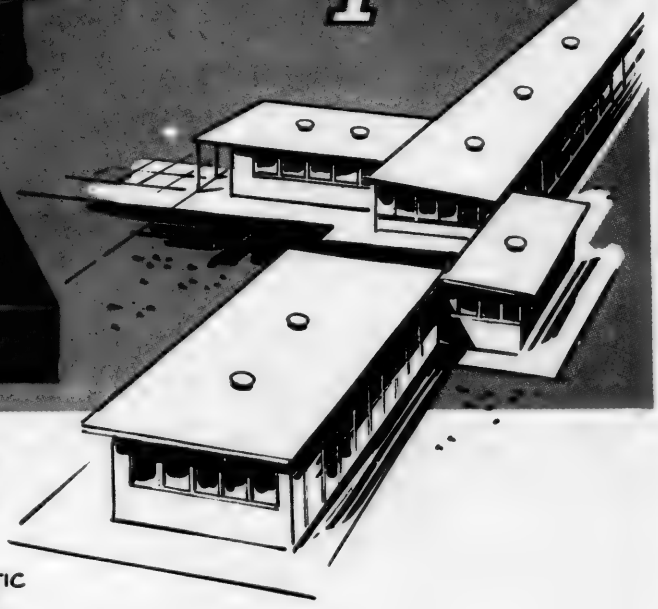
ASK FOR your copy of "Valve Performance Facts"—32 case histories on valve installations throughout industry. See your Crane Representative or write Crane Co. today.

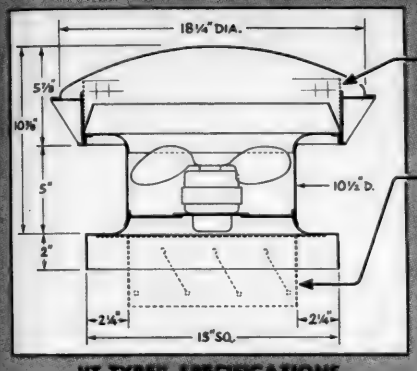
CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

NEW *Allen* T-TYPE ROOF FANS FIT MANY NEEDS "TO A T"





½" MESH BIRD SCREEN

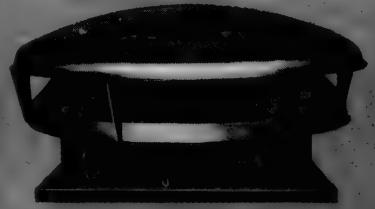
AUTOMATIC DAMPER OPTIONAL

"T-TYPE" SPECIFICATIONS

FAN DIA	MOTOR RPM	CAPACITIES (CFM)			
		.000 SP	.100 SP	.125 SP	.250 SP
10"	1550	420	255	230	110

115 volts, single phase, 1 watt motor

Rated in accordance with the Standard Test Code by the Texas Engineering Experiment Station



Allen low contour "I-Line" Roof Fans:
Direct Drive: 450 to 34,000 cfm.
Belt Drive: 4,000 to 20,150 cfm.

HERE'S the answer to today's architectural needs for low velocity roof ventilation on public and commercial buildings, especially one-story, flat-roof modern structures. The new Allen "T-Type" Roof Fan has a low, attractive silhouette (only 10⅞" high on the 420 model) that blends well with modern exteriors and its design and construction assure high efficiency, easy installation and low maintenance. Standard fabrication is of galvanized steel—aluminum is available. Automatic dampers are optional.

Now . . . one general design in wide range of capacities

Used in connection with the Allen "I-Line" Roof Fans, shown at left, the new "T-Type" now enables architects and engineers to have all ventilators on a roof of the same general design and low contour—from 420 to 34,000 cfm.

See Sweet's for the complete Allen line of roof ventilators —write for data on new "T-Type" Roof Fans

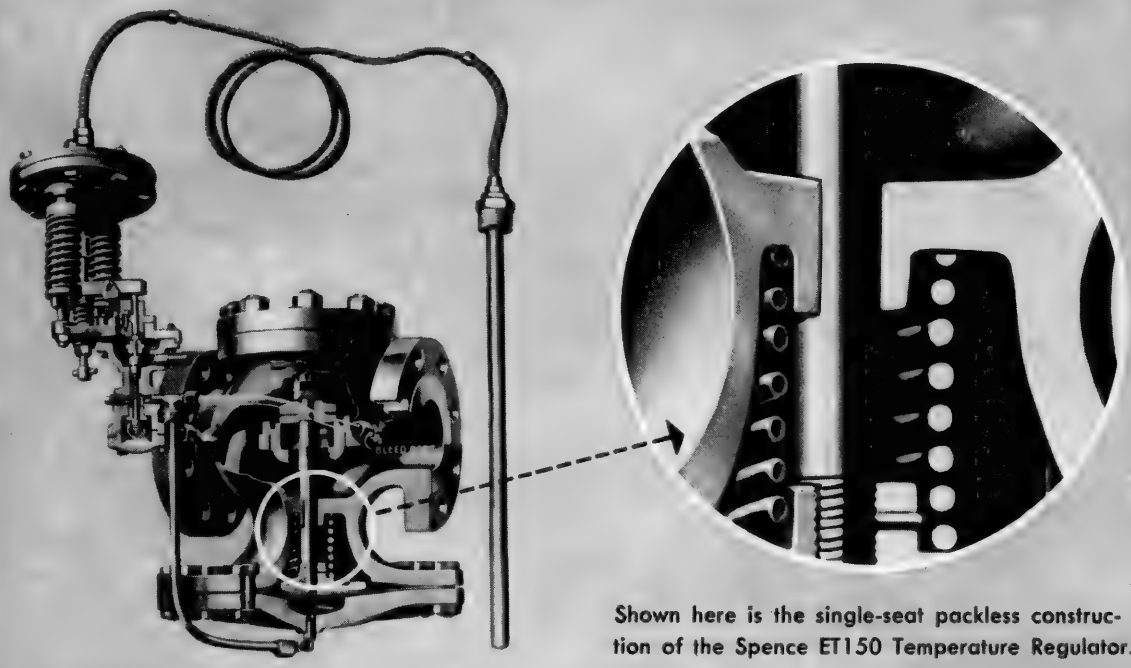
ALLEN ENGINEERED VENTILATION

ALLEN COOLER & VENTILATOR, INC.
ROCHESTER, MICHIGAN

Roof ventilators for every commercial and industrial need • Representatives in principal cities

VALVE TIPS:

Advantages of Packless Construction in Temperature Regulating Valves



Shown here is the single-seat packless construction of the Spence ET150 Temperature Regulator.

One of the biggest headaches in regulating valve maintenance is repacking stuffing boxes.

How often a valve needs repacking, how much time it takes, and the cost of the system downtime all vary with the construction of the regulator and the service it's used for. No matter how you calculate all these variables it's still a headache—and an expensive one.

In the temperature regulator shown above (Spence Type ET150) stuffing boxes are eliminated. This is done by what is known as "balanced" diaphragm construction. You can see in the cutaway drawing that pressure is applied to both sides of the large metal diaphragm. The upper side is exposed to delivery steam pressure and the lower side is exposed to loading pressure applied by the pilot. When the pilot closes, both delivery pressure and loading pressure are equalized through the bleedport and connecting tubing.

This construction not only does away with repacking problems, but it makes possible additional savings as well. For example, you will note in the sectional blow-up that this design eliminates a closely fitted stem and guide. Dirt or other foreign matter doesn't have much of a chance to lodge between these parts and cause sticking.

Another cause of binding or sticking, uneven expansion of closely fitted parts, is also eliminated with this design. In addition, valve stem wear is reduced for the same reason.

Lower maintenance is not the only advantage of this packless construction. Accuracy of regulation is also improved because friction due to a stuffing box, dirt, or uneven expansion is not a problem. The large, balanced metal diaphragm is more sensitive to slight changes in pressure.

Guaranteed Not To Wiredraw

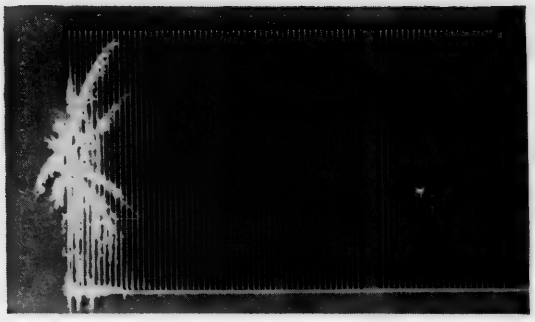
If seats and discs are cut by steam (wiredrawn) the loss of steam through these grooves can be another expensive item — directly charged against the regulating valve. Fortunately, you can eliminate these costly leaks by specifying a temperature regulator that is *guaranteed not to wiredraw.*

Spence makes such a guarantee because their seats and discs are made of SECO Metal. Over 20 years experience with this special alloy has failed to produce a single case where a SECO Metal seat or disc had been cut by steam. All that's required is an approved strainer located ahead of the regulating valve. Expensive steam leaks just can't happen with this combination of SECO Metal and single-seat design.

If you would like to have more information on Spence Temperature Regulators, drop us a line and ask for Bulletin T150. It gives more detailed information on these and other Spence design features. Piping layouts and helpful information on the installation of temperature regulators are also included. Write for your copy today.

SPENCE ENGINEERING COMPANY, INC.
Walden, New York

Will it freeze?

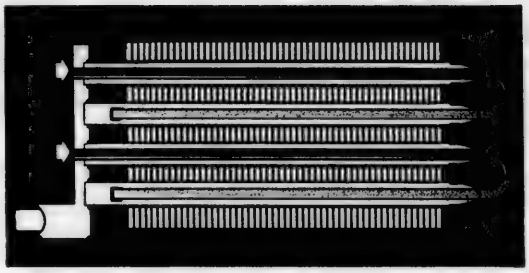


Freeze-ups are the biggest headache in heating and air conditioning. Steam condensate exposed to sub-freezing air . . . trapped water in poorly drained surface . . . bursted tubes . . . system shutdowns . . . irate customers . . . and the service costs that eat up profits—these things shouldn't happen to you!

And they won't—if you use Nesbitt Heating and Cooling Surfaces and observe the precautions made easy by the inherent protective features.

You get built-in protection with Nesbitt Heating & Cooling Surfaces

For full details of this exclusive surface, ask for Publication 305



Each trombone steam-distributing tube serves two adjacent condensing tubes from a single supply-header connection. Steam must travel across the first leg of the trombone tube (full length of surface) before reversing, under demand, to serve the second leg. Results: uniform discharge temperatures, controllability, and freeze protection *under all modulation.*

Series T Heating Surface with Trombone Steam-Distributing Tubes

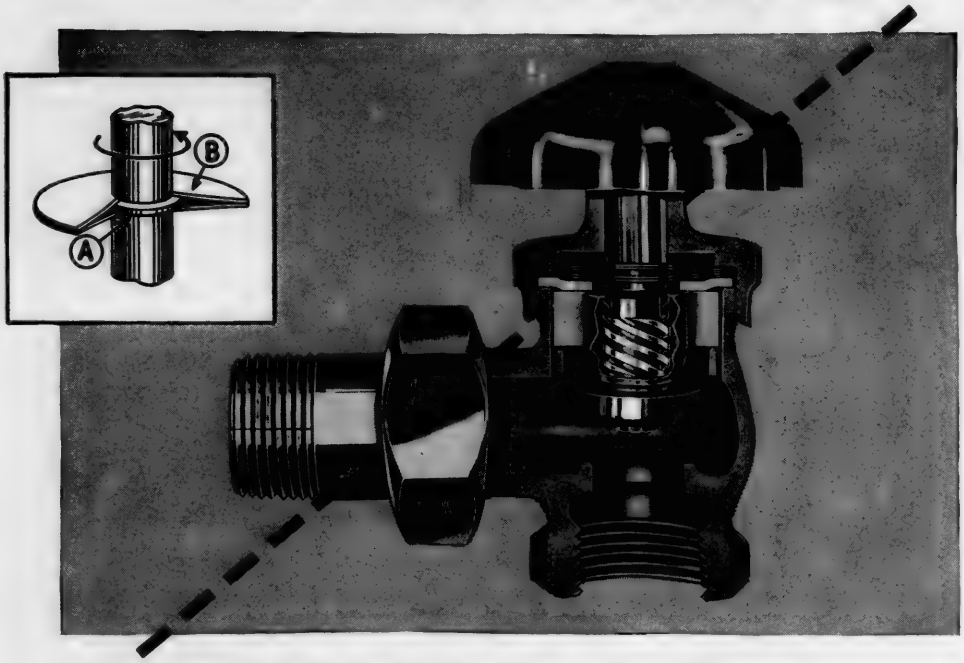
The story of Water Surface is told in Publication 246

To overcome the difficulty of water-draining in continuous-tube cooling surface, Nesbitt pitches its Series W Surface within the casing and incorporates its exclusive drain headers to relieve trapped bends. The drain feature is also embodied in cleanable-tube surface. No premium is charged for this safety precaution which can save you many dollars of grief.

Series W Water Surface with Pitched Coils and Drainable Feature

If you have been plagued with freeze-up problems, contact your nearest Nesbitt Representative and let him explain these inherent protective features.

A Valve that is



PACKLESS in fact

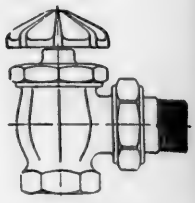
. . . *not just packless in name*

When the job calls for the kind of valve that will stand up across the years —when it calls for a valve that is packless in the full meaning of the word— then, no matter how far you look, you'll find in the Marsh Packless the only valve that completely fills the bill.

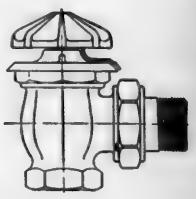
In fact, many users consider this the only valve that is packless in fact as well as in name, and they have a good reason for this. There is a difference between pack less and packless! The diagram tells the story of Marsh truly packless construction. A collar (A) is machined on the valve stem. The stainless spring steel wafers (B) press against this collar to form a tight annular seal This, you see, is a metal-to-metal seal—*permanently* leakproof.

And this better construction is typical of the quality and refinement found throughout the Marsh Packless Valve—in the swivel, self-seating, self-cleaning disc—in the excellent proportioning, machining, workmanship and finish.

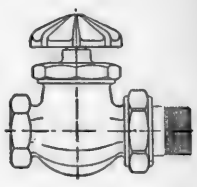
Packed valves can and do "blow out", scalding or burning the operator. This danger is avoided when you use the Marsh Packless. It is a valve you can rely on for any service up to 100 lbs. Furnished in a wide range of patterns including graduated and extended stem types, the Marsh Packless Valve is widely used for steam and hot water heating systems, coffee urns, steam kettles, sterilizers, ovens and similar services. Ask our representative or engineering department for facts.



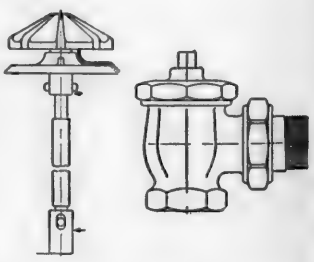
Wheel Angle



Wheel Angle Graduated



Globe



Extension stem

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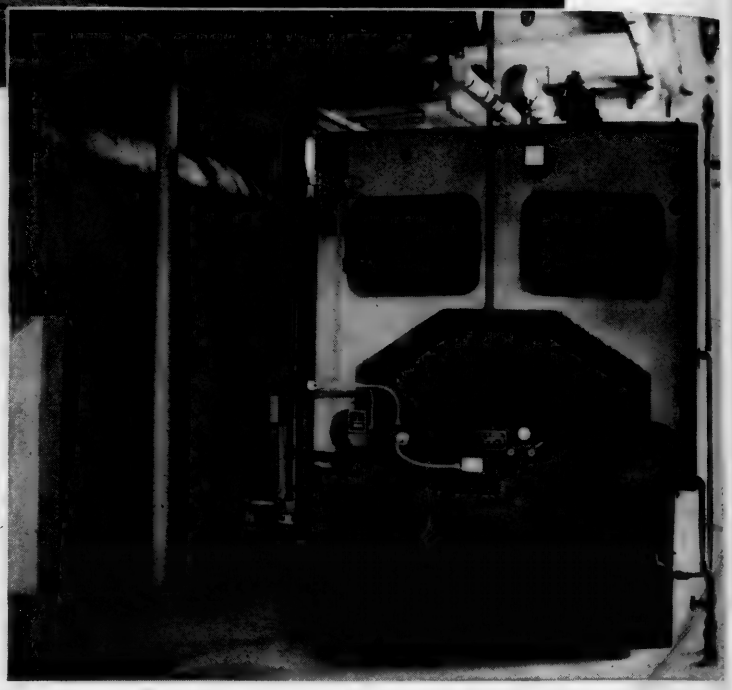

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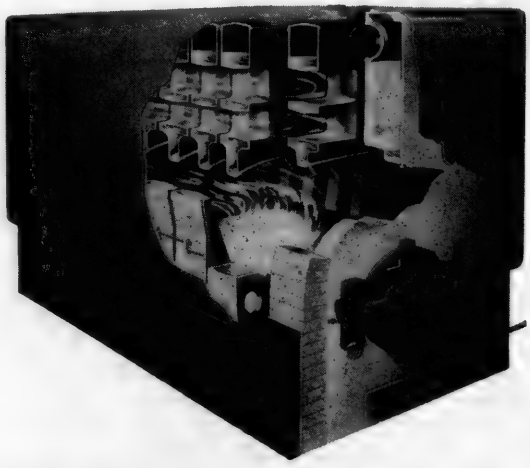

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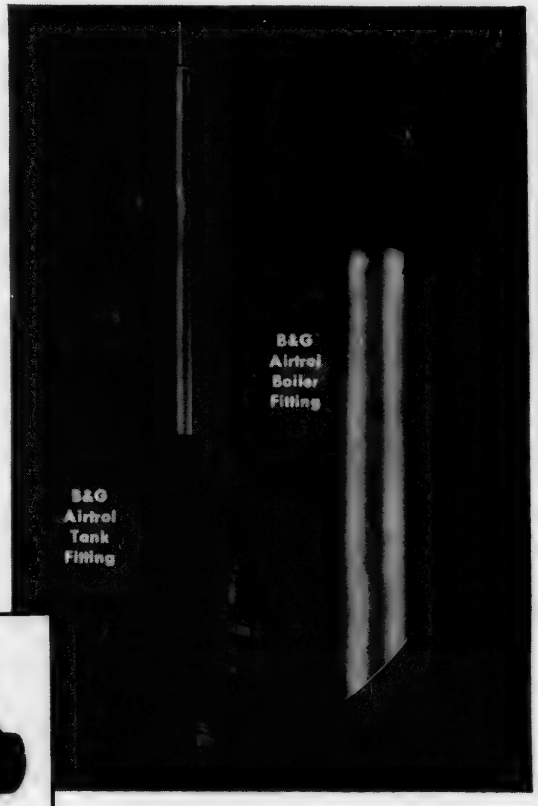

NEW B&G AIRTROL SIDE OUTLET BOILER FITTING

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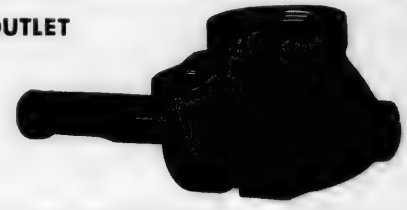
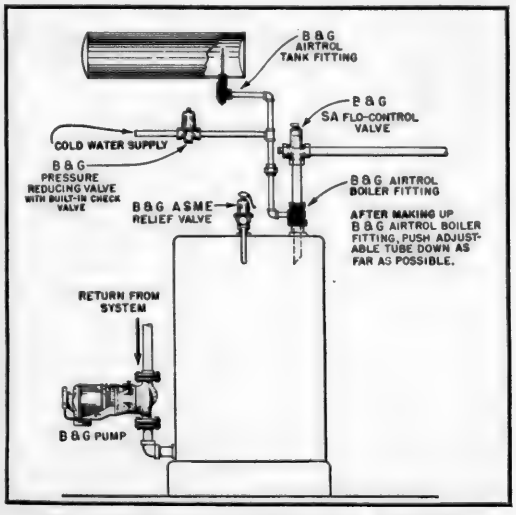
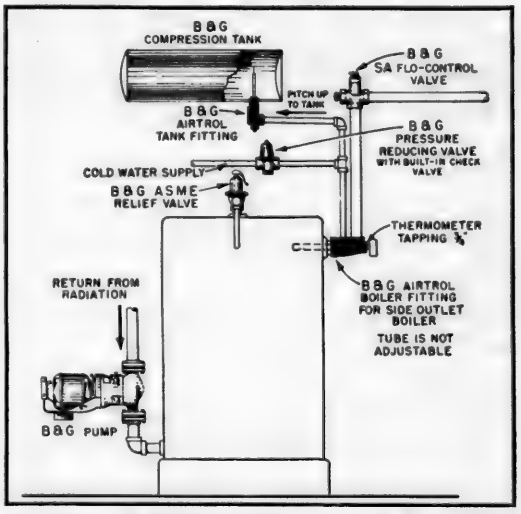



B&G AIRTROL TANK FITTING
B&G SA FLO-CONTROL VALVE
COLD WATER SUPPLY
B&G PRESSURE REDUCING VALVE WITH BUILT-IN CHECK VALVE
B&G ASME RELIEF VALVE
B&G AIRTROL BOILER FITTING
AFTER MAKING UP B&G AIRTROL BOILER FITTING, PUSH ADJUSTABLE TUBE DOWN AS FAR AS POSSIBLE.
RETURN FROM SYSTEM
B&G PUMP

B&G Airtrol System installed on top outlet boiler.


B&G COMPRESSION TANK
B&G SA FLO-CONTROL VALVE
PITCH UP TO TANK
B&G AIRTROL TANK FITTING
B&G PRESSURE REDUCING VALVE WITH BUILT-IN CHECK VALVE
COLD WATER SUPPLY
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THERMOMETER TAPPING
RETURN FROM RADIATION
B&G AIRTROL BOILER FITTING FOR SIDE OUTLET BOILER
TUBE IS NOT ADJUSTABLE
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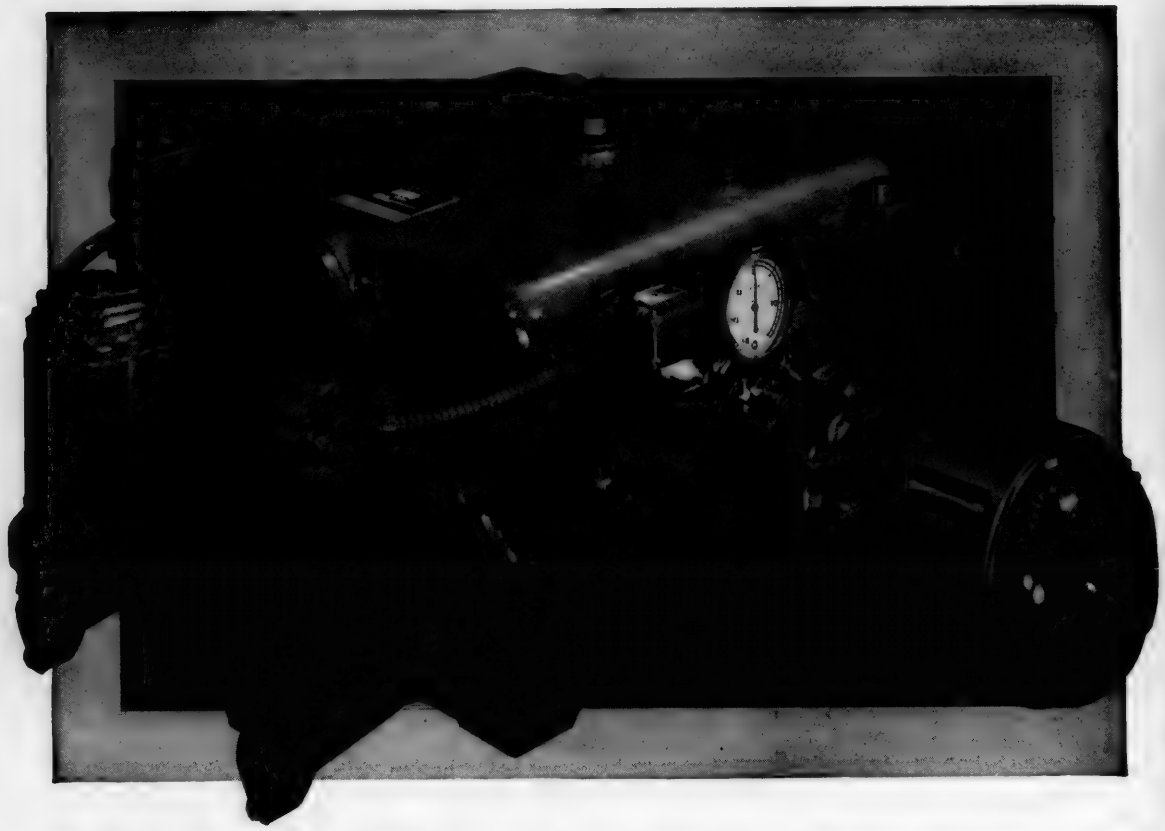

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These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low, returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

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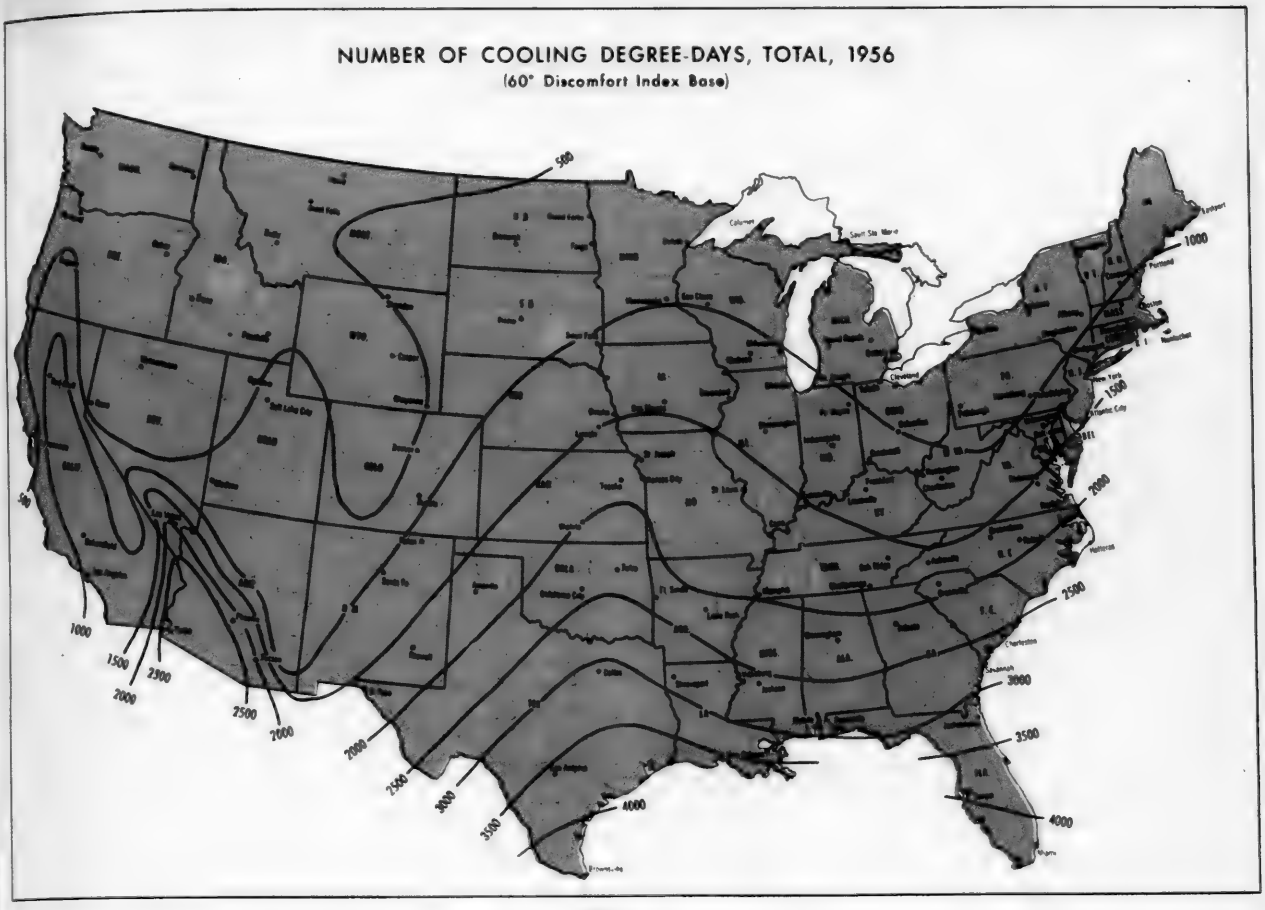


FIG. 1

A New Concept for Cooling Degree-Days

EARL C. THOM
Meteorologist, U.S. Weather Bureau

The author presents evidence that there is a relationship between air conditioning load and the number of cooling degree-days when the latter are calculated from the excess of Discomfort Index above a base of sixty.

ALONG with the spectacular increase of air conditioning there has grown a corresponding need for an acceptable unit of measurement of the effect of weather variables on the air conditioning load, a unit which would be proportional to the input normally needed to operate air conditioning installations. Preliminary study indicates that a variety of methods are now in use and that there is but little if any tendency toward uniformity in this regard. A number of these plans were discussed briefly in an article by the author on "Measuring the Need for Air Conditioning" in the August, 1956, issue of this publication.

In considering such a unit for cooling, it is natural to start from the heating degree-day concept which has served the heating industry well, if not perfectly, for a considerable number of years. And it is the purpose of this article to propose a method for establishing a cooling degree-day unit similar to the heating degree-day.

Considerable work has already been done on the general problem of the comparable need for air conditioning in the various sections of the country and extending this effort (1) to establish zones in which air conditioning is considered necessary by government agencies, or (2) in defining in an objective fashion the potential market for air conditioning equipment.

One of the first set of zones used to indicate areas where air conditioning was desirable and would be permitted in buildings under their jurisdiction was the base map showing "Design Effective Temperatures" prepared originally in 1946 by the General Services Administration of the United States Government. Fig. 6 has been reproduced from the 1952 revision of this original map. The basic method was the treatment of the design wet-bulb and design dry-bulb temperatures shown in "Summer Weather Data"[1] as simultaneous temperature occurrences to give "design" readings from standard Effective Temperature charts[2]. At present the General Services

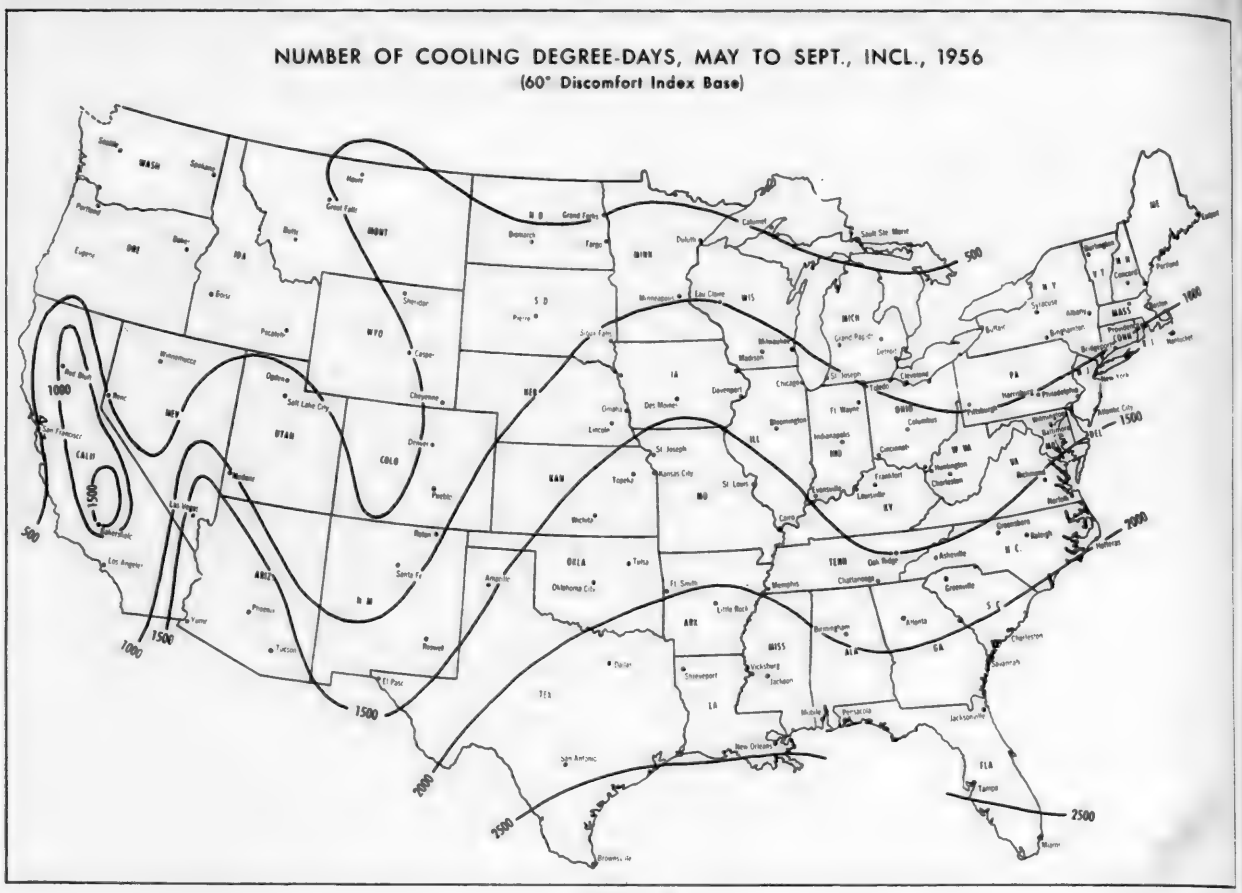


FIG. 2

Administration not only permits air conditioning installations in all areas shown as Zone A on this map but, wherever possible, allows such installations in Zone B. General Services Administration is responsible for the housing functions of the government involving the employment of 450,000 personnel.

United States Department of the Air Force has developed and is now using a somewhat more elaborate plan which places any location on the earth, for which climatic data showing the duration of dry-bulb and wet-bulb temperatures above selected base values are available, into one of four clearly defined zones.[3]

For a considerable number of years the Effective Temperature concept, i.e., the conditions which give approximately the same degree of human comfort, as developed by American Society of Heating and Air-Conditioning Engineers, has been widely accepted as authoritative. The use of Effective Temperature values as such, however, for air conditioning application has been complicated. The accepted method has been to read the desired effective temperature for each pair of simultaneous dry-bulb and wet-bulb (or relative humidity) observations from the Effective Temperature chart.

The successful use of the excess of the daily average of the simultaneous dry-bulb and wet-bulb readings above a selected base value as a measure of electrical energy used by air conditioning equipment, which was developed by one of the large operating utilities, led to the development of a measure *closely approximating the Effective Temperature* and which can be easily secured from dry-bulb and wet-bulb temperature readings.

Further work by J. F. Bosen, Office of Climatology, U.S. Weather Bureau, Washington, has developed a simple linear equation which gives still closer approximations of Effective Temperature values over the range of temperatures and relative humidities which are commonly observed during the summer season in the United States, giving values which constitute what can be termed a Discomfort Index. The results from this equation are sufficiently accurate also for practical application for the most extreme conditions observed. This linear equation is:

$$DI = [(T_d + T_w)/2] + 0.1[150 - (T_d + T_w)]$$

which can be further simplified to

$$DI = 0.4(T_d + T_w) + 15$$

where DI = Discomfort Index
T_d = Dry-bulb temperature as read in the shade, deg F,
T_w = Wet-bulb temperature as read in the shade, deg F.

In this formula, the dry-bulb and wet-bulb temperatures are from simultaneous readings.

A cooling degree-day concept can now be developed for measuring both the need for air conditioning and the amount of energy required to operate air-conditioning equipment under changing conditions. *The excess of the average of the sum of the individual hourly Discomfort Index values secured from the 24 pairs of hourly dry-bulb and wet-bulb temperatures over the base of 60 is proposed as the cooling degree-day value for the day.* The daily values can then be combined into weekly and monthly totals.

TABLE I—MONTHLY AND ANNUAL TOTAL NUMBER OF COOLING DEGREE DAYS FOR 1956 BASE, 60° DISCOMFORT INDEX

(Monthly totals of less than 10 are omitted from this table)

Station and Region	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Eastern Seaboard													
Rochester, N. Y.	0	0	0	0	58	167	225	217	82	0	0	0	749
Boston, Mass.	0	0	0	0	20	214	279	271	91	13	0	0	888
New York City, N. Y.	0	0	0	0	48	270	326	349	135	36	0	0	1164
Washington, D. C.	0	0	0	33	109	315	388	372	175	52	11	0	1455
Raleigh, N. C.	0	0	15	57	204	345	442	419	218	88	24	20	1832
Hatteras, N. C.	0	0	11	71	185	428	504	481	353	233	57	57	2380
Charleston, S. C.	0	47	50	119	326	413	512	481	285	178	43	64	2518
Tallahassee, Fla.	0	78	76	120	364	403	481	496	338	233	59	85	2733
Jacksonville, Fla.	0	125	99	165	411	443	543	535	383	305	97	107	3213
Tampa, Fla.	32	166	157	218	450	473	519	527	420	341	154	178	3635
Miami, Fla.	124	261	256	323	481	488	548	558	495	457	233	146	4370
Southern Section													
Atlanta, Ga.	0	12	28	77	289	368	465	450	263	121	19	39	2131
Montgomery, Ala.	0	48	44	106	372	420	496	519	308	171	27	68	2579
Jackson, Miss.	0	50	50	107	372	413	512	481	300	302	60	47	2694
Shreveport, La.	22	54	57	137	395	450	566	550	360	198	49	47	2885
New Orleans, La.	28	103	118	200	349	450	543	527	420	310	121	119	3288
Dallas, Texas	0	25	68	101	419	533	605	574	413	251	21	22	3032
Abilene, Texas	0	16	46	114	310	465	504	481	330	172	12	0	2450
San Antonio, Texas	25	70	90	185	403	503	535	481	405	271	50	48	3066
Houston, Texas	39	99	113	158	419	413	550	550	428	295	105	85	3254
Laredo, Texas	45	164	217	293	473	548	589	597	488	403	97	73	3987
Brownsville, Texas	129	200	238	360	457	488	535	558	465	411	142	150	4133
North Central and Mid-west													
Sault Saint Marie, Mich.	0	0	0	0	0	49	64	119	12	0	0	0	244
Fargo, N. Dak.	0	0	0	0	22	248	209	211	27	0	0	0	717
Minneapolis, Minn.	0	0	0	0	59	279	240	266	52	27	0	0	923
North Platte, Neb.	0	0	0	0	79	285	318	264	91	0	0	0	1037
Chicago, Ill.	0	0	0	18	95	300	302	326	97	37	0	0	1175
Columbus, Ohio	0	0	0	21	109	276	341	318	110	35	0	0	1210
Kansas City, Mo.	0	0	0	41	232	390	473	457	198	114	0	0	1905
St. Louis, Mo.	0	0	12	41	200	370	434	434	202	87	13	0	1793
Amarillo, Texas	0	0	0	0	154	354	364	318	203	77	0	0	1470
Oklahoma City, Okla.	0	0	25	61	104	405	481	457	300	136	0	0	1969
Ft. Smith, Ark.	0	0	31	56	333	413	527	519	278	145	0	0	2302
Memphis, Tenn.	0	13	18	82	326	413	527	504	248	126	28	24	2309
Nashville, Tenn.	0	0	20	64	258	368	488	457	225	92	0	0	1972
Knoxville, Tenn.	0	0	23	50	241	335	419	411	210	90	0	0	1779
Mountains and the Southwest													
Billings, Mont.	0	0	0	0	56	178	240	168	48	0	0	0	690
Casper, Wyo.	0	0	0	0	0	87	147	75	24	0	0	0	333
Reno, Nev.	0	0	0	0	15	36	132	62	21	0	0	0	266
Salt Lake City, Utah	0	0	0	0	54	68	271	178	84	0	0	0	655
Denver, Col.	0	0	0	0	21	188	194	145	54	0	0	0	602
Las Vegas, Nev.	0	0	0	31	163	338	457	380	323	68	0	0	1760
Winslow, Ariz.	0	0	0	0	34	180	287	209	135	0	0	0	845
Albuquerque, N. Mex.	0	0	0	0	54	270	287	247	173	34	0	0	1065
Yuma, Ariz.	0	0	56	123	147	480	615	581	570	244	27	0	2843
Phoenix, Ariz.	0	0	29	96	279	450	543	496	443	163	0	0	2499
Tucson, Ariz.	0	0	0	41	225	420	465	434	390	197	0	0	2172
El Paso, Texas	0	0	0	21	279	383	388	364	330	87	0	0	1852
Pacific Coastal Area													
Seattle, Wash.	0	0	0	0	30	0	119	98	17	0	0	0	264
Red Bluff, Calif.	0	0	0	41	138	278	426	318	225	66	0	0	1492
Sacramento, Calif.	0	0	0	20	85	203	264	217	188	62	0	0	1039
San Francisco, Calif.	0	0	0	0	11	31	43	48	75	10	0	0	218
Fresno, Calif.	0	0	0	54	102	248	372	295	270	96	0	0	1437
Bakersfield, Calif.	0	0	14	74	183	300	427	349	308	108	0	0	1763
Los Angeles, Calif.	0	0	0	11	46	203	202	235	218	109	42	0	1066

For example, for a given hour, if $T_d = 86$ and $T_w = 62$, then $DI = .4(86 + 62) + 15 = 89$ for that hour. An average of the 24 values of DI arrived at similarly gives the average DI for the day, and the number of cooling degree-days for that day would be the excess of the average DI over 60. If this average were 68.2,

TABLE 2—VARIATION THROUGHOUT THE DAY IN AVERAGE DISCOMFORT INDICES
(to nearest tenth)

Month and City	Local Time							
	2 a.m.	5 a.m.	8 a.m.	11 a.m.	2 p.m.	5 p.m.	8 p.m.	11 p.m.
	Discomfort Index							
May, 1956								
Brownsville, Tex.	72.4	71.6	75.7	77.9	78.5	76.8	74.5	73.2
June, 1956								
Chicago, Ill.	65.4	65.3	70.2	73.0	74.0	72.6	69.9	67.9
July, 1956								
Miami, Fla.	75.8	75.4	78.8	80.4	80.5	79.7	77.4	76.9
Yuma, Ariz.	76.2	75.0	77.9	82.0	84.9	84.7	80.6	77.7
August, 1956								
Amarillo, Tex.	65.3	64.0	68.7	73.9	76.5	75.2	70.6	67.1
Boston, Mass.	64.2	65.6	69.3	71.4	71.8	70.6	68.5	67.1
September, 1956								
Atlanta, Ga.	65.6	64.7	67.0	71.5	73.4	72.8	69.3	67.4
Kansas City, Mo.	63.8	62.0	64.2	70.1	73.5	73.5	69.1	66.7
October, 1956								
Billings, Mont.	46.7	46.8	47.5	53.1	58.2	56.9	52.7	49.6

$DI = (68.2 - 60) = 8.2$ cooling degree-days.

In view of the need for a universally recognized cooling degree-day system, the concept described in this paper is being developed by practical test. For this purpose it is planned to have it tested experimentally during the next one or two cooling seasons at a number of the larger Weather Bureau offices where cooperation with the local operating utilities can be arranged. After this test a decision can be reached as to whether the system as proposed, or some adjustment of the system, will render a

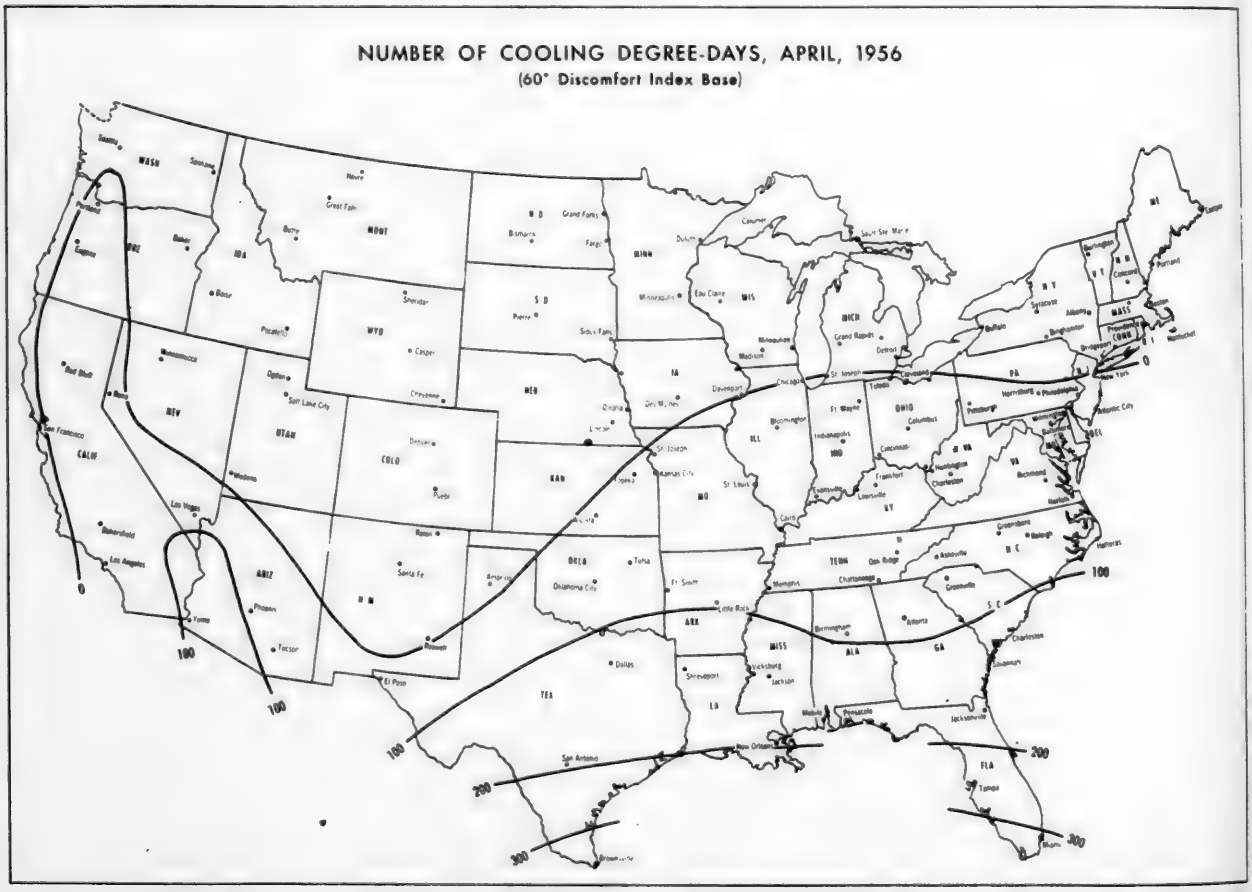


FIG. 3

useful service to the air-conditioning and associated industries. In such event, the concept can be proposed for possible adoption in the same sense that the heating degree-day plan now in use is accepted in regular practice of the industry and the Weather Bureau.

Considerable preliminary work has been done on this cooling degree-day plan using the Discomfort Index as basic data. Published data for the calendar year 1956 have been used as illustrative material since the basic original observational material was not conveniently available. Fig. 1 gives close approximations of the total cooling degree-days for 1956 in the form of an isoline base map. These lines are based on computations for 55 of the larger Weather Bureau offices using the official dry-bulb and wet-bulb temperature observations as published for 1 a.m., 7 a.m., 1 p.m., and 7 p.m., EST. The 7 a.m. and 1 p.m. EST observations often do not closely approximate the usual time of maximum and minimum temperature at all seasons for all parts of the country. Computations could have been improved if it had been practicable to utilize all of the 24 separate hourly observations. It should be emphasized that the 1956 chart as shown is not to be taken as representing normal conditions, although the year as a whole was not particularly abnormal.

["Weather of the Year," an article published in Climatological Data, National Summary for 1956, summarizes the dry-bulb temperature conditions for 1956 in this language:

"Temperatures for the year of 1956 were below normal in the Florida Peninsula, New Jersey, New York, and New England, from the upper half of Michigan through the Dakotas, in most sections of the Pacific States, most of Idaho, northern Wyoming and northwestern Colorado. Departures exceeded 1 deg only at scattered northern stations. The remainder of the country was above normal. The positive departures were greatest in the lower Great Plains, exceeding 2 deg in scattered sections."

Since the air-conditioning situation for the year is heavily controlled by the conditions during the summer season, the following from the same article describing the temperature conditions for the summer of 1956 will perhaps be of more interest in this regard:

Earl C. Thom attended the University of Kansas and in 1923 received his A.B. in mathematics from York College. He took additional courses in the Graduate School, Department of Agriculture, Washington, D. C. After graduation he taught in high schools in Kansas, Missouri and Nebraska until September, 1931 when he entered the service of the U. S. Weather Bureau at the then newly opened airport station at Denver, Col. During 1934 and 1935 he was a civilian employee of the Adjutant General's Office, War Department, Washington, D. C. He has been in the Central office, U. S. Weather Bureau since 1935 and has served in the Marine Division, Aerological Division, Climate and Crop Weather Division, and at present is in the Office of Climatology. He is the author of a number of Weather Bureau publications and has contributed articles to department publications.

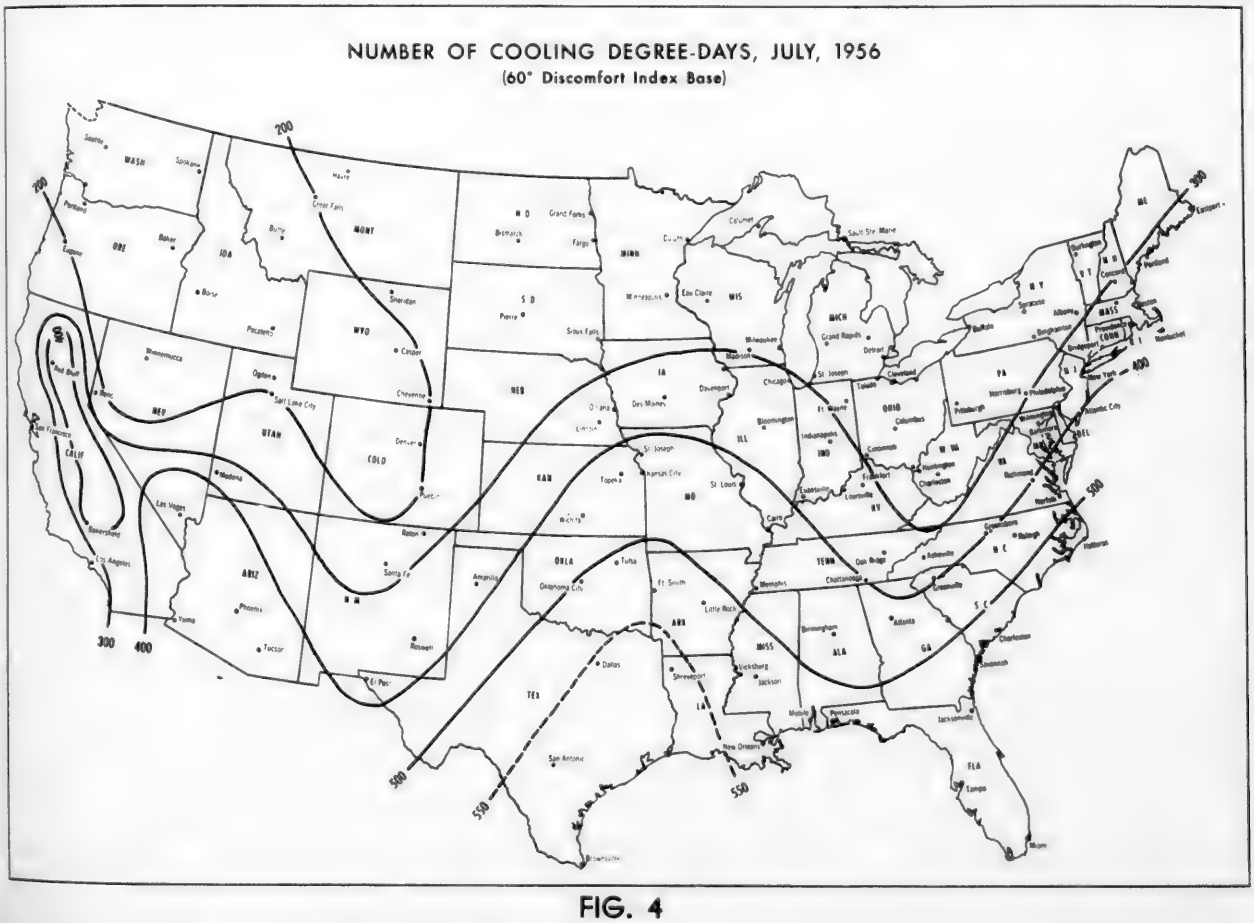


FIG. 4

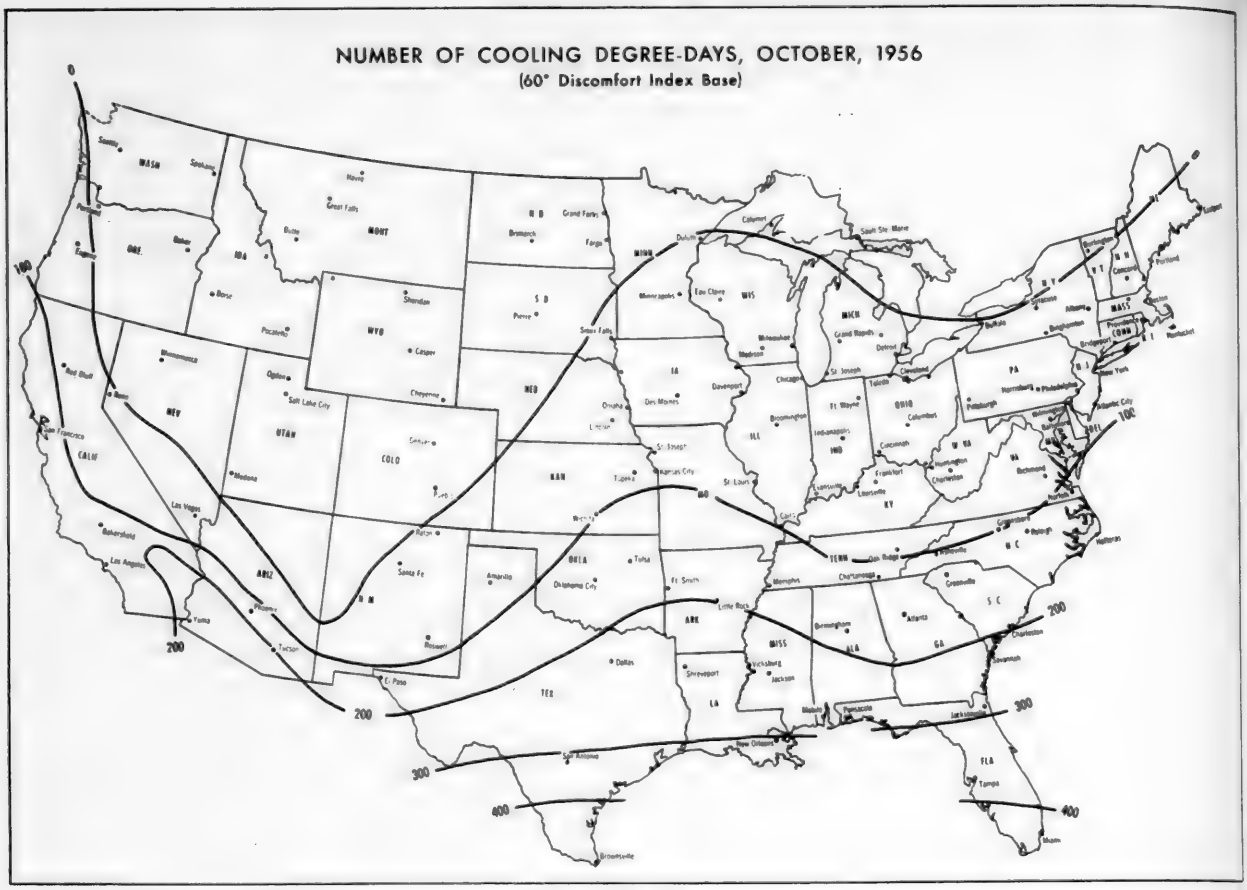


FIG. 5

"The summer was unusually warm in the Great Plains, with temperatures averaging 2 deg or more above normal in large areas from South Dakota southward through Texas. Above normal temperatures were unusually persistent in the lower Great Plains particularly Oklahoma and Texas where temperatures remained almost continuously above normal except during a sharp, cool snap from August 19 through the 23rd. In the upper Great Plains summer temperatures averaged above normal only because of an unusually hot June, as both July and August were relatively cool. The summer was also 2 deg or more warmer than normal along the California coast. Notable hot periods occurred in the northern Plains from June 8 to 13, and in the lower Great Plains and lower Mississippi Valley during the first half of August. During the latter period maximum temperatures at Shreveport, Louisiana, equaled or exceeded 100 deg on 15 consecutive days (Aug. 4-18), a new record there.

"The summer was abnormally cool in the upper Great Lakes region and Northeast, and in most of the area west of the Rocky Mountains, particularly the Great Basin. In the Northeast June was about normal or a little above while July and August were both unusually cool, particularly July which was 4 deg or more cooler than normal in some areas. At Hartford, Connecticut, 76 deg was the lowest maximum temperature ever recorded in July and the average temperature for the month, 69.4 deg, was the lowest there since 1891. The water temperature in Lake Erie at Buffalo, N. Y., averaged 66 deg, the lowest in 29 years of record."]

Figure 2 gives an isoline base map of the cooling degree-day total for the 5-month period from May through September, 1956, and Fig. 3, 4, and 5 give similar data for the separate months of April, July, and October, 1956, respectively. The method used for calculating these data is the same as that used in Fig. 1. Temperature departure maps for these three separate months are available for reference in published form[4] and a discussion of the corresponding conditions for each month is also available[5].

It appears likely that there is little if any need of air conditioning during the month in any area where the cooling degree-day total for that month is less than 100. On the other hand, it will be seen from Fig. 4 that only a small area of the United States does not need air conditioning in midsummer.

The approximations of the 1956 monthly and annual total cooling degree-days for the selected stations which are graphically represented in Fig. 1 to 5, incl., are shown in detail in Table 1. Stations in this table are arranged by regions. An analysis of the data indicates that at near sea level locations in the United States the cooling season (months having cooling degree-day totals of 100 or over) most frequently includes July and August only in areas north of 45° N. latitude; usually extends from May through September in the area from 40° to 45° N.; usually from May through October in the area from 35° to 40° N.; usually from April through October in the area from 30° to 35° N.; and most often from February through December in areas lying south of

TABLE 3—HIGHEST DISCOMFORT INDEX DURING JULY, 1956, AT SELECTED STATIONS

Station	Maximum Discomfort Index	Associated Temperatures	
		Dry-bulb	Wet-bulb
Dallas, Texas	89	106	79
Yuma, Arizona	89	109	75
Bakersfield, California	88	107	76
Red Bluff, California	88	111	71
Laredo, Texas	87	103	78
Portland, Oregon	87	102	77
Omaha, Nebraska	86	104	74
Evansville, Indiana	86	97	80
Montgomery, Alabama	85	96	78
Las Vegas, Nevada	85	106	68
Raleigh, North Carolina	84	93	79
Tucson, Arizona	84	105	68
Boise, Idaho	83	106	64
Washington, D. C.	83	93	77
Miami, Florida	82	90	78
Amarillo, Texas	82	95	72
Sheridan, Wyoming	81	101	64
Hatteras, North Carolina	81	84	80
Salt Lake City, Utah	80	100	62
Albany, New York	80	86	76

30° N. latitude, based on analysis of 1956 records.

So that the diurnal change in the Discomfort Index can be conveniently examined, the average Index for the month has been compiled for 3-hour intervals for selected stations and months as shown in Table 2.

Examples of some of the higher Discomfort Index values as determined by an inspection of the hourly observations taken during the month of July, 1956, are given in Table 3. There is shown also the simultaneous dry-bulb and wet-bulb temperature values which produced the index in each instance. It is interesting to note that 81 deg, the highest Discomfort Index for the month at Hatteras, N. C., resulted from 84 deg dry-bulb, 80 deg wet-bulb (relative humidity 84%) combination, while the same 81 deg index at Sheridan, Wyo., resulted from 101 deg dry-bulb, 64 deg wet-bulb (relative humidity 12%) combination. This illustrates the fact that the same amount of discomfort occurs under widely differing dry-bulb temperature conditions.

The cooling degree-day proposal as presented may not prove adequate when it has been given a field test. If the base, for example, needs modification to improve the correlation with the air-conditioning load this will be discovered and put into effect before the large job of computing normal cooling degree-days is attempted. Even after normals are computed for one selected base it would appear possible that a method could be developed so that normal cooling degree-days for any base could be secured by statistical procedures. Such a method has been developed for the heating degree-day system by Herbert C. S. Thom[6].

At the present time, the effort to develop a cooling degree-day plan along the lines suggested, with the idea that the plan would be universally acceptable, is perhaps ambitious in view of the number of somewhat similar ideas now in use. It is possible, however, that even if this is not completely accomplished the effort will prove to be a valuable contribution to the industry. If this plan

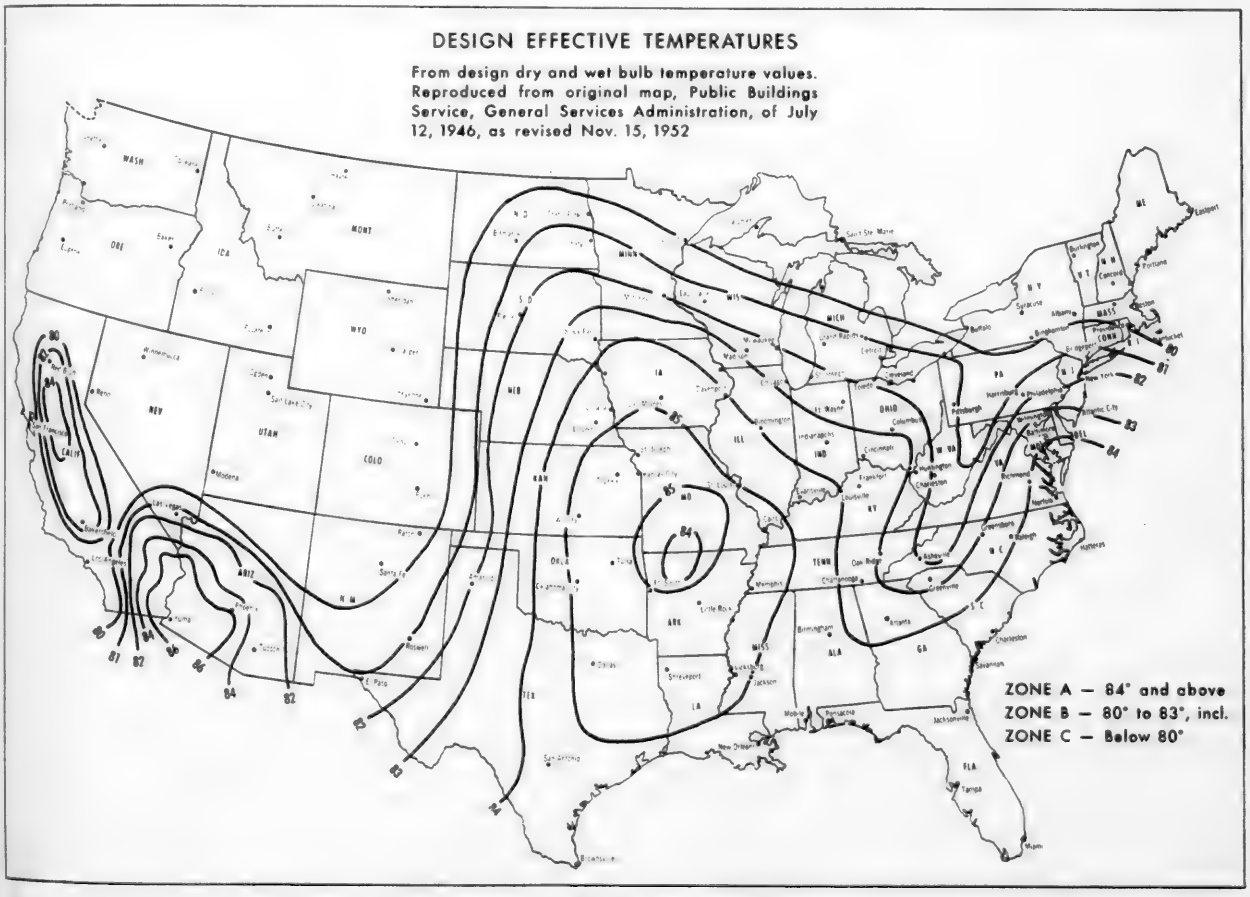

DESIGN EFFECTIVE TEMPERATURES
From design dry and wet bulb temperature values.
Reproduced from original map, Public Buildings
Service, General Services Administration, of July
12, 1946, as revised Nov. 15, 1952
ZONE A — 84° and above
ZONE B — 80° to 83°, incl.
ZONE C — Below 80°

FIG. 6

should not be accepted by all concerned, it might prove that two or more indices would be found useful for different purposes. This is already the case in the financial world where the Standard and Poor index has recently joined the older statistics of the same type such as the Dow-Jones or New York Times index. Each of these now fills a specific use in measuring market trends.

References

[1] "Summer Weather Data", The Marley Co., Fairfax and Marley Roads, Kansas City, Mo., second printing, 1944.

[2] See pages 124 et seq, 1956 edition, "Heating, Ventilating, and Air Conditioning Guide", American Society of Heating and Air-Conditioning Engineers. Also "Determination of the Comfort Zone," by F. C. Houghten and C. P. Yaglov, ASHVE Trans., 1923.

[3] Such data appear in "Compilation of Air Weather Service Weather Data" prepared September, 1954, by the Directorate of Facilities Support, Office of the Assistant Chief of Staff, Installations, Headquarters United States Air Force. The application of such data appear in prior and subsequent official memoranda.

[4] The May 7, August 6, and November 5, 1956, issues of the Weather Bureau publication, *Weekly Weather and Crop Bulletin*, contain the temperature departure maps for the months mentioned.

[5] See Temperature Section of the General Summary of Weather Conditions in the April, July and October, 1956, issues of the Weather Bureau publication *Climatological Data, National Summary*.

[6] "Normal Degree-days Below Any Base", by Herbert C. S. Thom, a paper presented at the Baltimore meeting of the American Meteorological Society, April 30, 1954, and later published in the May, 1954, issue of *Monthly Weather Review*.

Radioactive Waste Disposal from Peacetime Nuclear Applications

The handling and disposal of radioactive wastes is a general problem whose thread runs through the complete fabric of peaceful nuclear energy operations. In the peacetime day-to-day application of the benefits of nuclear energy the disposal of wastes potentially represents the major "non-beneficial" effect on the public and its resources. Therefore, it is probably this segment of the operations that is of greatest direct interest to the public health professional. Waste materials in either gaseous, liquid or solid form are evolved in essentially all operations associated with nuclear energy facilities beginning with mining of ore, through feed material production, reactor operation and chemical reprocessing of reactor fuels. Because of the nature and characteristics of the radioactivity involved, including, in specific instances, very long effective life, its ability to cause damage to human tssue; and its potential danger as an environmental contaminant, the safe handling and final disposal of wastes from the nuclear energy industry are integral and important aspects of these operations. This importance is attested to by the efforts expanded in the atomic energy program to date on this subject. More money probably has been spent, and more scientific and technological effort concentrated, on facilities, operations, and research and development with regard to this industrial waste than on any other industrial contaminant known. The application of nuclear technology will depend to a considerable degree on the ability to find practical solutions to problems of waste handling and disposal associated with nuclear operations. While it reasonably can be argued that no industry can be considered a mature segment of our economy unless and until it handle and disposes of its wastes in an acceptable manner, there is sufficient basis for the belief that the nuclear energy industry can develop in a rational way without being "bottlenecked" by its wastes. This conviction should not, however, carry the implication that specific answers are immediately available. Much research, development, pilot-plant testing and field evaluation remain to be done.

One of the major objectives of engineering in this field is control over the radiation hazard from these wastes Obviously, this involves control over the movement or mobility in the environment of the waste products themselves. This introduces the two basic waste disposal concepts that are applicable to the waste problem in its broadest sense. The radioactive materials may be permanently confined or isolated within restricted areas, away from people and their resources. This is the concept of "concentrate and contain." On the other hand, the radioactivity may be irreversibly reduced to safe levels by dilution in nature. This is the concept of "dilute and disperse." For example, with suitable environmental conditions certain types of laboratory liquid wastes in which the concentration of radioactivity is only a few times greater than drinking water standards may be disposed of under the latter concept. At the other end of the spectrum highly active liquid wastes originating from the chemical processing of irradiated fuels must be handled under the former philosophy. For all practical purposes the waste materials evolving from the chemical processing of irradiated fuels contain, by far, the greatest concentrations and total quantities of radioactivity and constitute the bulk of the long-term technological problem of waste disposal. It should be emphasized, however, that the fact that wastes containing smaller quantities of radioactivity may be amenable to direct dispersal in the environment makes it inherently important to carefully control such operations to assure that the safe capacity of the environment is not exceeded.

Established burial grounds for solid radioactive wastes exist only at large atomic energy production and development sites such as Oak Ridge, Irado, Savannah River, Hanford and Los Alamos. These facilities are in isolated areas with detailed geology and hydrology generally favorable to burial ground location. Within AEC, the operating establishment other than those noted above usually consist of relatively small areas and are in or near densely populated sections with perhaps less favorable geology and hydrology. In these cases the general procedure is not to dispose of wastes on site but to ship to one of the established burial grounds for final disposition.

To date relatively small quantities of radioactivity have been disposed of at sea. In these instances this has been a safe, practical method of disposal. However, among other things, the costs of sea disposal operations, including shipping to port, appear to preclude the widespread use in this country of this method over burial.

This material is from a talk by Joseph A. Lieberman, sanitary engineer, Engineering Development Branch, U. S. Atomic Energy Commission.

Solar Research House

Will Develop Data for Engineers

THE good probability that moderate-cost research in solar space heating can produce really significant results has prompted the Institute of Atmospheric Physics, University of Arizona, Tucson, to plan the Solar Energy Research Station. A residential-sized structure, planned for construction late this summer, will incorporate a space heating-cooling system using solar energy for winter heating, and net radiant exchange with the night sky for summer cooling.

In addition to its facilities for measuring and recording the common climatological factors of temperature, humidity, wind direction and velocities, and pressures, the Institute has unusually comprehensive specialized facilities for radiation measurements. These facilities include continuous-record equipment for measurement of total sunshine and direct-beam sunshine intensity, atmospheric radiation and net radiation exchange with the atmosphere, and atmospheric water-content.

In the past, basic solar radiation measurements, climatological and meteorological studies, and research in the technology of solar heating have been conducted by separate organizations. Since the reaction of the structure and of the heating-cooling system to its climatic environment is fundamental to proper research in this field, the compartmentation of effort which has attended previous studies would seem to be a real shortcoming.

Type of System to Be Used

The heating and cooling system for the test building will use water as the energy transport and storage medium. A bare collector will cover much of the south-facing portion of the roof. During winter heating cycle the collector will be operated during sunny periods to collect solar heat. During summer the collector will be operated nightly to reject heat.

Interior heating and cooling will be accomplished by metal ceiling panels, similar in construction to the exterior collector plate.

Necessary thermal storage will be provided by a tank of water, probably to be located in a basement. The system will incorporate a heat pump, so arranged that it will operate only when necessary to raise or lower the temperature of the water prior to delivery to the interior panels.

The general scheme of operation is illustrated in Fig. 1 and 2. For winter heating solar collector obtains its water circulation from near the bottom of the storage tank, and the interior house-heating panel system from near the top. The system will be so sized that during most winter conditions the collector can maintain the house-heating load while operating at a water temperature sufficiently high for direct use by the panel system. Under these conditions the storage tank will be kept at a fairly uniform temperature top and bottom, since thermosyphon action within the tank will preclude the formation of a layer of warm water below a cold layer. During severe cold or cloudy periods, when the collector is unable to maintain the tank at requisite temperature level, the heat pump will operate to raise the temperature of the upper part of the tank and lower the tem-

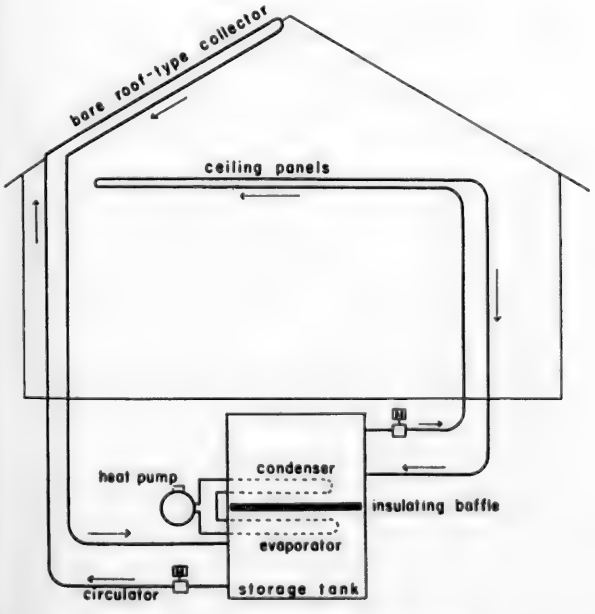


Fig. 1. Winter heating flow scheme.

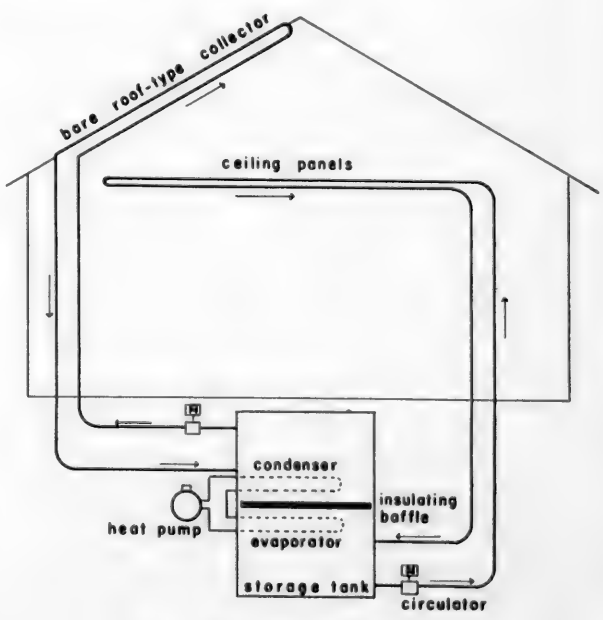


Fig. 2. Summer cooling flow scheme.

perature of the bottom part. This is a stable type of stratification, and little or no mixing will occur. The result will be that the upper part of the tank will be at the necessary temperature level for use by the ceiling panel system, and the lower part will be colder. The solar heat collector will continue to add heat to this colder water. Furthermore, if the water temperature continues to drop, due to the action of the heat pump, the collector will operate with increasing collection efficiency. When the severe cold or cloudy spell passes, the collector will regain sufficient useful heat collection to both maintain the house load and bring the entire tank back up to a temperature level usable by the panel system, at which point heat pump operation will cease.

Summer Cooling

For summer cooling the bare collector is used to reject heat each night, by radiation and convection to the atmosphere. The only change in the system flow scheme is that the relative positions of the collector and ceiling panel circulations from the tank are reversed. In summer the collector (operating as a heat rejector) circulates from near the top of the tank, the panel system from near the bottom. During moderate summer weather the nightly operation of the collector will maintain the entire tank at a temperature sufficiently low for direct use by the panel cooling system. During hot periods, when the collector is unable to reject the house cooling load at a sufficiently low collector operating temperature to maintain the entire tank at a temperature directly usable by the ceiling panels, the heat pump will again provide assistance. Just as in winter, it will raise the temperature of the top of the tank and lower it at the bottom. This will result in the lower part of the tank being at a sufficiently low temperature for proper operation of the panel cooling system, and the upper part of the tank will be at a higher temperature. As in the similar winter situation, the collector will continue to operate, in this case at a better heat rejection efficiency as the temperature of the upper part of the tank rises. And, again similarly, when the period of hot weather passes and moderate summer weather returns, the collector will regain sufficient heat rejection capacity to both handle the entire house cooling load and bring the tank down to a temperature usable by the ceiling panels, at which point heat pump operation will cease.

Collector ceiling panels will be fabricated from metal sheets with built-in water-circulating tubes. The processes for manufacturing these sheets were developed in 1954 and 1955 by several large manufacturers and the sheets are at present chiefly used in the fabrication of refrigerator evaporators. Both the relatively low cost of sheets produced by these processes and the thermal performance of the sheets make them well suited for solar heat collectors and for interior heating-cooling panels.

General Description of Test Program

It is expected that the heating-and-cooling installation will be operated on a well-instrumented test basis for three or four years. A strong effort will be made, both in setting up the instrumentation and in later analysis of data, to ensure that the information obtained will be broadly and fundamentally useful in the design of various types of solar heating-and-cooling systems operating under various climatic conditions.

Five categories of information will be sought: (1) Detailed analysis of collector heating performance as a function of operating conditions; (2) summer performance of the bare collector as a heat rejector; (3) interior performance of building; (4) development of a practical method for estimating seasonal solar heat collector performance in a given locality from existing weather records; and (5) development of a general method for optimum sizing of interrelated components of heating and cooling systems using heat pump assistance for least possible owning plus operating cost.

How Remote is District Air-Conditioning Control?

Development of telemetering systems for remote control of complex industrial processes engenders speculations as to its applicability in the heating and air-conditioning field.

One device announced recently, called Electro-Span by its manufacturer, Pacific Div., Bendix Aviation Corp., North Hollywood, Calif., operates over existing communications facilities, such as telephone and telegraph lines and VHF and microwave radio bands, sensing or measuring in terms of numbers by the digital computing system.

For example, a petroleum tank farm is equipped with gages at each tank which set up level information in digital code form. The remote operator interrogates a specific tank by dialing its number on his control unit. The gage transmitters send liquid level information. One by one the tanks report back to the central control station, identifying themselves. Monitoring during filling of the tank is possible, as well as adjustment of the liquid level through remote valve actuators.

Transmission of weather data is another application of the device. Wind direction and speed, temperature, barometric pressure and dew point can be rapidly accumulated at a central station. Permanent data logging can be maintained at the central station.

In each application the system spots a condition of temperature, liquid level, or pressure, for example, and then reports on that condition so that valves or switches can be actuated to make the proper adjustments. Coded commands are translated into positioning of shafts, switching of motors, pumps, and valves.

Transmission of data is so accurate, it is said, that the level of liquid in a storage vessel can be measured, transmitted, and recorded within $\frac{1}{8}$ inch in 64 ft.

Use of such a device for district air-conditioning and heating control might take one of many forms. Perhaps an area central station will collect weather information from a ring of stations around the area, in turn issuing commands to central station air-conditioning systems of the buildings in its province, turning on refrigerating machines or boilers, depending on whether a cold or heat wave is approaching.

For Hot Water Heating Systems:

Compression Tank Selection Chart

RICHARD S. DAWSON

Richard S. Dawson Co., Los Angeles, Calif.

The selection of compression tank sizes for normal hot water heating systems is facilitated by this reference chart. Presented are 5 steps for the chart's use and an example, as well as limitations of the chart and correction factors to be applied for conditions other than those upon which chart is based.

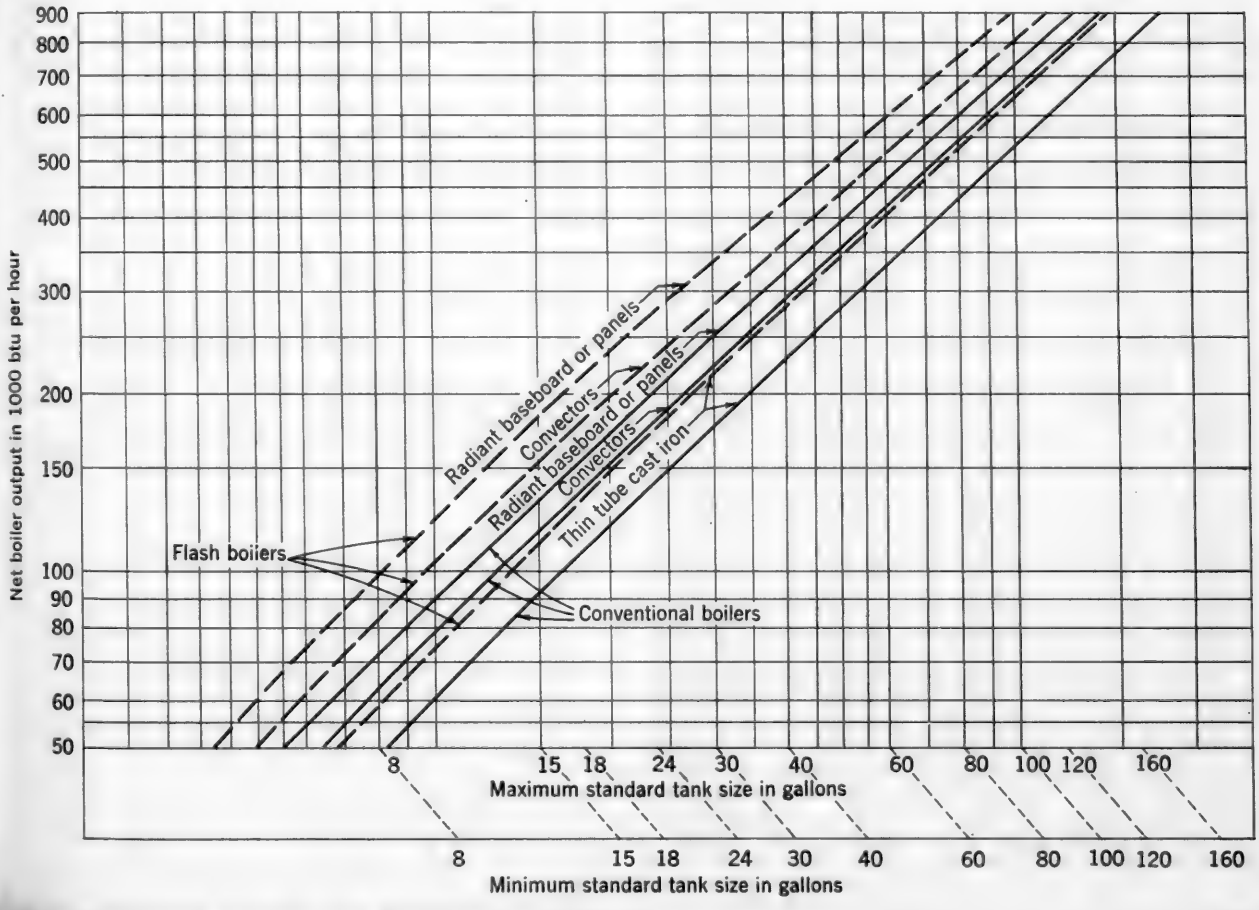
COMPRESSION tanks are used in hot water heating systems for three reasons: (1) to allow the system to operate at temperatures above 212 deg F; (2) to control rate of pressure increase with temperature rise in the system; and (3) to eliminate relief valve operation, with consequent need for refilling the system with water, unless unsafe conditions occur.

There has been need for a simple method of selecting compression tank sizes which will give a sufficiently accurate selection for normal hot water heating systems. Such a short cut method must consider all major variables directly, with all minor variables covered and applied as

TABLE 1—CORRECTION FACTORS APPLICABLE TO TANK SIZES AS FOUND IN SELECTION CHART

(Standard conditions are 12 psig initial pressure, 30 psig final pressure, and 18.5 ft maximum system height above tank. For single-pipe systems, deduct 13-20% from tank size given conventional boilers; 18-22% from tank size given flash boilers)

Initial Pressure Psig	Static Height Ft	Multiply Tank Size as found by
12	18.5	1.00
16	27.5	1.43
20	36.5	2.18
24	46.0	3.82



a single safety factor. The selection chart shown was devised to meet this need. It is based on data published by H. A. Lockhart and G. F. Carlson of the Bell and Gossett Co., Morton Grove, Ill.

The use of this chart should be limited to conventional hot water heating systems. It should *not* be used for multi-story buildings, water temperatures above 220 deg F, or specially designed industrial installations. The selections it indicates are based on standard, commercially available compression tank sizes.

The following steps should be followed in use of the chart:

1. Determine net boiler output and locate on left-hand scale.
2. From this point, draw horizontal line to intersect the appropriate system curve. The choice is made from flash or conventional boiler source, hot water heating systems utilizing radiant panels or baseboard, convectors, or thin tube cast iron pipe.
3. From this intersection, extend vertical line downward through both maximum and minimum base lines.
4. Select compression tank size as indicated where vertical line intersects dotted, diagonal line. If vertical line does not intersect a dotted line, use next larger tank size to right.
5. Apply correction factor, if necessary, from Table 1 to tank size.

As an example in use of the chart, assume a conventional boiler source of 300,000 Btu per hr net output for a hot water heating system utilizing convectors. Extend from the 300,000 Btu per hr point on the left-hand scale horizontally to the solid-line convector curve, and project from this intersection downward through the two base lines. Assuming standard chart conditions of 12 psig for reducing valve setting and 30 psig for relief valve, a 40-gallon compression tank is found to satisfy the system's requirements.

Determining Available Solar Radiation

Engineering application of solar energy depends upon the availability of sufficient data on solar radiation. Research toward this end has produced formulae which agree rather closely with recorded data from Weather Bureau publications.

Among information published in the Journal of Applied Solar Energy Science and Engineering, January, 1957, by Clarence F. Becker, assistant professor of agricultural engineering, University of Wyoming, and James S. Boyd, associate professor of agricultural engineering, Michigan State University, is the following:

A plot of incident radiation on a horizontal surface at various north latitudes against number of months from June 21 reveals an almost identical amount, about 2650 Btu per day per sq ft, in summer for all latitudes. In winter, the differences are significant, due primarily to the decrease in daylight hours in the more northern areas. Empirical equations, fourth degree polynomials, based on the plotted curves, have an average deviation from the calculated value of 15 Btu per sq ft per day.

Solar radiation on a south-facing vertical wall is a maximum in winter due to lower solar altitudes where radiation is more normal to a vertical surface. During most of the year, the rate is higher in the more northern latitudes.

Optimum tilt angle for a solar collector depends on latitude and seasonal demand. Maximum radiation will fall on a south wall tilted to receive the sun's rays perpendicularly at noon. For instance, at 40 deg north latitude, the optimum angle is about 27 deg from the vertical in January, 82 deg in June.

The ratio of tilted to horizontal surface radiation, Y, where X is the angle from the vertical of a south wall in degrees, is given by the second degree polynomial

$$Y = a + bX + cX^2.$$

Values of the coefficients are given in the table, as presented in the original article.

If the above values of Y are multiplied by the incident radiation on a horizontal surface, as mentioned above, total incident radiation for any day can be obtained.

Following are the empirical formulas mentioned above, where y is incident radiation on a horizontal surface, x is the number of months from June 21.

30 deg lat. $y = 2669.4 - 75.845x^2 + 1.0231x^4$
35 deg lat. $y = 2656.9 - 89.671x^2 + 1.2824x^4$
40 deg lat. $y = 2635.9 - 101.213x^2 + 1.4342x^4$
45 deg lat. $y = 2581.1 - 110.988x^2 + 1.5978x^4$

Percentage increase of solar radiation with altitude, u for summer, and v for winter, is given in the following formulae, where z is altitude in thousands of feet. They are valid for altitudes between 2,000 and 10,000 ft.

$$u = 2.955 + 4.685(z - 1) - 0.225(z - 1)^2$$
$$v = 1.414 + 2.922(z - 1) - 0.133(z - 1)^2$$

COEFFICIENTS FOR TILT RATIO FORMULA

Date	Latitude	Coefficient		
		a	*b*	*c*
Dec. 21	30°	1.496	0.012657	−0.0002025
	35°	1.734	.014313	.0002502
	40°	2.132	.012366	.0002774
	45°	2.499	.010621	.0003033
Jan. 21 and Nov. 21	30°	1.322	0.014395	−0.0001999
	35°	1.510	.013339	.0002112
	40°	1.827	.013236	.0002500
	45°	2.154	.012117	.0002776
Feb. 21 and Oct. 21	30°	0.997	0.014531	−0.0001613
	35°	1.141	.015173	.0001860
	40°	1.312	.014250	.0001972
	45°	1.500	.013619	.0002139
Mar. 21 and Sept. 21	30°	0.638	0.016279	−0.0001361
	35°	.768	.015605	.0001445
	40°	.872	.015237	.0001532
	45°	1.011	.015365	.0001722
Apr. 21 and Aug. 21	30°	0.314	0.017447	−0.0001083
	35°	.400	.017659	.0001221
	40°	.492	.016878	.0001249
	45°	.571	.018014	.0001472
May 21 and July 21	30°	0.186	0.016350	−0.0000806
	35°	.244	.016964	.0000944
	40°	.345	.015827	.0000944
	45°	.399	.016884	.0001132
June 21	30°	0.105	0.016696	−0.0000744
	35°	.205	.016145	.0000805
	40°	.277	.016064	.0000889
	45°	.326	.017028	.0001055

Calculating the Heat Requirements of a Snow Melting System

Part 10—Southwest Central Region

WILLIAM P. CHAPMAN

This is the tenth article of a series which will eventually cover all parts of the U.S. where snow melting systems are likely to be used. The first article summarized the basic equation for heat required for snow melting and defined the free area ratio as the ratio of slab area free of snow to total slab area. In order that each installment of this series can be understood, both the classification of systems and an explanation of the four tables are repeated.

THE total heat output of a snow melting system depends on the rate at which it melts the snow, and this rate in turn depends on the relative importance of rapid snow removal among the different types of applications. Snow melting systems can be classified as follows:

Class I (minimum): Residential walks or driveways and interplant areaways;

Class II (moderate): Commercial (stores and offices) sidewalks and driveways and steps of hospitals; and

Class III (maximum): Toll plazas of highways and bridges, and aprons and loading areas of airports.

These classifications depend upon the allowable rate of snow melting. For example, a residential system does not have to melt snow as rapidly as a commercial system. In fact, a depth of snow of an inch for an hour or so during a heavy storm might not be objectionable with a residential system. On the other hand, a store manager would claim the system was inadequate if half an inch accumulated on the sidewalk in front of his store. The difference, then, between a Class I system and a Class II system is in the ability of each system to melt snow. The one feature that is common to all classes is that the systems must be adequate for some combination of weather factors. Or, the designer wants to be able to say that he will pay to melt snow whenever conditions are milder than some critical value but he is willing to have an inadequate system for a given fraction of the time. In other words, the designer will run a calculated risk providing he knows the odds of that risk. For a residential system, where initial cost must be at a minimum, the designer must accept more frequent snow accumulations.

Naturally, the owner is not concerned about an explanation of why there is an accumulation of snow on

the sidewalk. It is immaterial whether the accumulation is due to excessive snowfall or whether it is due to an extremely cold snowfall. In both cases, the ultimate reason is that an inadequate flow of heat is reaching the surface. The true analysis of heat output, then, depends on an analysis of the weather. This is true of all three classes.

The total heat requirements of a snow melting system are determined, therefore, by (a) the total area of the snow melting slab, (b) the rate at which the snow is to be removed, and (c) the values and frequency distribution of each of the pertinent climatic variable (humidity, wind, temperature, and snowfall). Obviously (c) varies from city to city and, due to the complexity and number of calculations to obtain a frequency distribution of the four variables, the evaluation of (c) has been virtually impossible. However, by the use of punched cards and statistical tabulating machines, data have been derived so that the heat requirements for a given city can be simply presented.

The designer needs two types of information. First, the most severe combinations of variables on which to base his *design output*, and second, the heat required over the season so that *operating costs* can be determined. These data are given in Tables 1, 2, 3, and 4 which follow and which cover three cities in the Southwest Central region of the U. S.

Table 1

The first table gives some generalized information on snowfall and snow on the ground. The next to last item, "Greatest depth of snow on the ground" indicates the greatest depth to which snowfall has ever accumulated. Other items are self-explanatory.

Table 2

Table 2 contains the operating information of a snow melting system. For freezing temperatures (32 deg and below) but no snowfall the system may be "idling." That is, the designer may want to supply some heat to the slab so that there will be immediate melting when snow starts to fall. The column on mean temperature gives the average temperature during *freezing* temperatures. This temperature is used in calculating the "idling" load. The other term needed to calculate idling load is the wind velocity during the period of freezing temperatures.

The column "Hours of Snowfall" indicates the number of hours that snow is falling at rates equal to or greater than 0.01 inch of water equivalent per hour. Roughly speaking there are snowfalls of "trace" quantities about twice as often as there are for measurable quantities of 0.01 inch or more. It is assumed that these light falls can be handled by the idling load.

The remaining columns of Table 2 represent the frequency distribution of required heat output. This distribution is based on the solution to the basic equation for two values of the free area ratio A_r. This distribution represents the heart of the analysis and is also the basis for Tables 3 and 4.

Table 3

Table 3 contains the *design* heat requirement—as explained in the footnotes to Table 3. These design rates may be altered by the designer if he feels that a particular job should have a different design criterion from those given in the footnote. Any change in design selection should be based on the frequency distribution given in Table 2.

Table 4

Table 4 contains the data required to estimate the operating cost of a snow melting system. The footnotes to Table 4 explain the various items.

Use of the Tables

Example. Determine the frequency distribution of heat output for a system in Colorado Springs that will operate with a minimum free area ratio of 0.5.

From Table 2 we have the frequency distribution for $A_r=1$ and $A_r=0$. If the maximum output for $A_r=0$ is taken for each output with $A_r=1$, then it will be certain that the system has a minimum free area ratio of 0.5. The maximum output for $A_r=0$ is 63 Btu per (hr) (sq ft); therefore, the frequency distribution would be as shown in Table A.

In other words the maximum output for $A_r=0.5$ is 187 Btu per (hr) (sq ft).

If, then, the system were designed for an output of 200 Btu per (hr) (sq ft), exclusive of back and edge losses, it would operate with a minimum free area ratio of $200 \div (311+63) = 0.535$, and from Table 2 it can be seen that it would operate at a free area ratio of unity for all but the last three cells. In other words it would provide

TABLE 1—GENERAL INFORMATION ON SNOWFALL, SOUTHWEST CENTRAL REGION

Item	Colo. Springs, Colo.	Salina, Kan.	Lincoln, Neb.
Approximate mean number of days with an inch or more of snow on the ground	40	33	40 70 (with trace or more)
Average number of inches of snow fall per year	24.3 55.9**	17.9	26.3
Greatest snowfall in 24 hours, inches	23.0**	12.3*	12.4
Greatest depth of snow on the ground, inches	32.6**	12.0*	17.1
Mean number of days per year with snowfall of 1 inch or more	17** 73 (with trace or more)	4* 30 (with trace or more)	9 42 (with trace or more)

*For Wichita, Kan.
**For Denver, Colo.

TABLE A—OUTPUT FREQUENCY DISTRIBUTION FOR SNOW MELTING SYSTEM WITH MINIMUM FREE AREA RATIO OF 0.5, BASED ON TABLE 2 FOR COLORADO SPRINGS, COLO.

(0.5) (Sum of Max. Cell Output for $A_r=1$ and Max. Output for $A_r=0$)	Btu per (Hr) (Sq Ft) Required Output	Percent of Total Snowfall-Hours
(0.5) (99 + 63)	81	63.1
(0.5) (149 + 63)	106	19.0
(0.5) (199 + 63)	131	7.5
(0.5) (249 + 63)	156	4.4
(0.5) (299 + 63)	181	5.5
(0.5) (311 + 63)	187	0.5

TABLE 2—DATA FOR DETERMINING OPERATING CHARACTERISTICS OF SNOW MELTING SYSTEMS IN THE SOUTHWEST CENTRAL REGION[1]

Period of No Snowfall

City	Air Temperature, Deg. F[2]		Mean Temperature During Freezing Period[6]	Wind Velocity, Freezing Period,[6] mph
	Over 32	Below or Equal to 32		
	Percent of Winter Hours with No Snow at Above Temperatures			
Colo. Springs, Colo.	54.3	43.6	22.1	11.5
Salina, Kansas	60.0	38.5	23.3	10.9
Lincoln, Nebraska	45.0	52.5	20.8	10.1

Period of Snowfall[3]

City	Hours of Snowfall[2]		Free Area Ratio, A_r	Required Output, Btu per Sq. Ft. per Hr.[4]									Maximum Output, Btu per Sq. Ft. per Hr.
	Percent	Hr. per Year		0–49	50–99	100–149	150–199	200–249	250–299	300–349	350–399	400–up	
				Frequency Distribution of Snowfall Hours at Above Outputs Percent[5]									
Colo. Springs, Colo.	2.1	76	1	26.8	36.3	19.0	7.5	4.4	5.5	0.5	—	—	311
			0	98.4	1.6	—	—	—	—	—	—	—	63
Salina, Kansas	1.5	54	1	44.9	31.9	12.7	7.6	2.2	0.7	—	—	—	286
			0	23.5	6.2	0.3	—	—	—	—	—	—	120
Lincoln, Nebraska ..	2.5	91	1	32.7	26.2	20.0	13.9	5.7	1.5	—	—	—	293
			0	97.2	2.6	—	—	0.2	—	—	—	—	202

[1]The period covered by this table is from Nov. 1 to March 31, incl. with February taken as a 28¼ day month. Total hours in period = 3630.
[2]The percentage in Columns 2 and 3 plus the percent under hours of snowfall total 100%. Note that "Hours of Snowfall" does not include idling time, and is not actual operating time. See text.
[3]Snowfalls of trace amounts are not included; hence, "Hours of Snowfall" includes only those hours of 0.01 inches water equivalent per hour snowfall.
[4]Output does not include allowance for back or edge losses since these depend on slab construction.
[5]Percentages total 100% of the number of hours of snowfall.
[6]"Freezing Period" is that during No Snowfall when the air temperature is 32 deg or below.

a clear slab for $100-(4.4+5.5+0.5)=89.6\%$ of the time. In other words a design output of 200 Btu per (hr) (sq ft) would be adequate for many systems.

Southwest Central Region

The Southwest Central region, as defined in this article, lies in the heart land of the United States. The western boundary runs along the continental divide in Colorado from Wyoming to New Mexico. The northern boundary follows the Colorado-Wyoming border to the Nebraska line, then north to the North Platte River. The North Platte and Platte rivers form the northern boundary to the Missouri River which, with the Kansas-Missouri line, forms the eastern boundary of the region. The southern boundaries of Kansas and Colorado form the southern boundary of the region.

Just the western quarter of the region is mountainous. The remaining three quarters are flat, and are, in fact, part of the Great Plains. Both Denver and Colorado Springs lie at the foot of the Rockies, but are almost on the western edge of the region. From Denver, which is at an altitude of 5300 ft to Kansas City, which is at an altitude of 750 ft, there is a steady eastward downslope. This distance is about 550 air miles. It can be said, therefore, that this region is essentially open and flat.

The Rocky Mountains run almost due north and south and are parallel to the western boundary. Their effect, however, extends all the way to the eastern edge of the district. In fact, the effect of the chinook (warm, dry wind coming down from the Rockies) often produces rapid rises in temperature in Lincoln during the winter. Both Denver and Colorado Springs, of course, have the mild, semi-arid climate that is typical of the central Rocky Mountains district. Both these cities are situated to the lee of the Rockies in the path of the prevailing westerlies. This is the main reason that the weather in these cities is rather dry and mild.

Occasionally, however, cold air masses moving southward over the plains are intensified by the high altitude, and the temperature can drop quickly and severely. Generally, though, the old air masses are too shallow to reach the higher altitudes of Denver and Colorado Springs. Extreme weather usually occurs when the prevailing westerlies weaken and permit the polar air masses to bear westward more than usual.

The snow season is quite late in the Denver-Colorado Springs area. Winter precipitation accounts for just 11% of the annual total and almost always falls as snow. The spring precipitation accounts for 39% of the annual total and the bulk of it falls as snow. For example, at Denver, March has the highest mean snowfall, 10.8 inches, as compared with 8.2 and 6.2 for December and January. In May, 1912, Denver reported 13.2 inches, but the maximum monthly snowfall was in December, 1913, with a fall of 57.4 inches. The mean annual snowfall is 55.9 inches with a minimum of 27.2 in the winter of 1903-1904, and a maximum of 118.7 in the winter of 1908-1909.

Colorado Springs is somewhat higher than Denver with an elevation of 6200 ft as compared to 5300 ft for Den-

TABLE 3—DESIGN DATA FOR SNOW MELTING SYSTEMS, SOUTHWEST CENTRAL REGION

City	Design Output, Btu per (Hour) (Sq Ft)		
	Class I System[1]	Class II System[2]	Class III System[3]
Colo. Springs, Colo.	49*	63	293
Salina, Kansas	85	120	228
Lincoln, Nebraska	64*	202	246

[1]For Class I (residential) Systems, the design output is set at that required heat output (see Table 2) when $A_r = 0$ at the 98th percentile of the frequency distribution; that is, where 98% of the hours have this output or less.
[2]For Class II (commercial) Systems, the design output is the maximum output when $A_r = 0$ in Table 2 (last column).
[3]For Class III (industrial) Systems, the design output is determined by the following four requirements: (1) Output is never exceeded for two consecutive hours; (2) Output for $A_r = 1$; Table 2, is at least 1 Btu per hour per sq ft greater than maximum output for $A_r = 0$; (3) A_r is greater than or equal to 0.5 the maximum requirement shown in Table 2 for $A_r = 1$. That is $q_d = q_s + q_m + 0.5\ (q_e + q_h)$ for the conditions where $q_t = q_s + q_m + q_h + q_e$ are a maximum; (4) The free area ratio A_r is unity for at least 98% of the hours listed in Table 2.
*See Table 4—Idling rate is greater than Class I design rate.

ver. This may account for the drier, colder winter climate of Colorado Springs. Denver has a mean degree day figure of 5827 and an annual mean snowfall of 55.9 inches; Colorado Springs has 6254 and 24.3 for the same records.

Lincoln, Nebraska is in the northeastern corner of the region, and is at an altitude of 1200 ft. Even so, it has a climate quite similar to Denver, but on the colder side. For example, the mean monthly temperature for January in Lincoln is 25.0 deg F as compared to 30.5 deg in Denver. Lincoln is in the path of the polar air masses that move south from Canada. Quite often, though, the moderating influence of the dry, milder westerly winds from the Rockies prevent the full force of these polar air masses from moving in on Lincoln.

The average annual snowfall is 26.3 inches, but very often it is light and does not remain on the ground for very long. In March, 1912, a record accumulation of 16 inches was measured. The snow season starts in November and ends in March with February showing the highest average of 6.5 inches (about 25% of the total). The maximum snowfall was recorded in the winter of 1914-1915 and amounted to 59.4 inches. In January, 1915, a record fall for one month was recorded at 23.0 inches.

Lincoln has about the same number of degree days per year as Denver, but that is because the spring and summer months are cooler in Denver than in Lincoln. Denver has only 24 days per year with maximum temperatures equal or below freezing; Lincoln has 41. Also Lincoln has 11 days below zero and Denver has but 8.

The data in Table 2 show a marked similarity in the snowfall pattern of Lincoln and Colorado Springs (it probably would have been closer if Denver had been used instead of Colorado Springs). In addition to the similar frequency of snowfall, notice the similarity in the frequency *distribution*. At Salina there is about one fall every three years with $A_r=0$ and $q>99$. Except for freak storms, both Lincoln and Colorado Springs would show a maximum below 100 for $A_r=0$. Similarly for $A_r=1$, the spread is just 25 Btu per (hr) (sq ft) from 286 to 311.

The greatest difference is in the maximum values for $A_r=0$. Colorado Springs shows $q=63$. Notice in Table 4, however, that the idling rate for Colorado Springs is 63. This is unique for the 33 cities studied. In several cases the idling rate exceeded the Class I design rate but never did the idling rate equal the Class II design rate.

According to the data in Table 3, Colorado Springs has the widest range of design conditions. The Class I design rate is the lowest at 49 and the Class III design rate is equal to the maximum recorded for Lincoln 293 Btu per (hr) (sq ft). This seems somewhat inconsistent since in other respects the climatic conditions are quite similar. It seems likely, therefore, that a Class II design rate for Denver might be considerably higher—possibly 150 Btu per (hr) (sq ft).

The data in Table 4 indicates that rarely would it be possible to justify idling the system for all periods when the air temperature was freezing or below. In Colorado Springs the idling time would be 20 times the melting time and for a Class II system the fuel cost would be 25 times as much. For Lincoln the fuel costs would be about 15 times as great.

TABLE 4—YEARLY OPERATING DATA, SOUTHWEST CENTRAL REGION

City	Idling			Melting		
	Time,[1] Hr. per Year	Rate,[2] Btu per (Hour) (Sq. Ft.)	Output,[3] Btu per (Year) (Sq. Ft.)	Time,[4] Hr. per Year	Class[5]	Output[6] Btu per (Year) (Sq. Ft.)
Colo. Springs, Colo.	1583	63.4	100,000	76	I	3960*
					II	3960*
					III	7390
Salina, Kansas	1398	53.9	75,400	54	I	2920
					II	3370
					III	3810
Lincoln, Nebraska	1906	67.2	128,000	91	I	4750*
					II	8350
					III	8520

[1]From Table 2, Column 3 × 3630 (hr per year).
[2]Rate when idling, Btu per (Hr) (Sq Ft) = $(0.27V + 3.3)\ (32 - t)$, where V = wind velocity from Column 5, Table 2, and t = air temperature from Column 4, Table 2.
[3]Product of the two preceding columns.
[4]Hours of Snowfall, from Column 7, Table 2.
[5]See footnote for Table 3.
[6]Based on the condition that surface temperature is maintained at 33 deg until required output exceeds design output, at which time design output is used regardless of required output. Distribution of required output based on Table 2.
*Based on Idling Rate rather than Design Rate.

LIFE OF DEPRECIABLE PROPERTY FOR TAX PURPOSES

The lives, in years, listed here are those used by the Internal Revenue Service, U. S. Treasury Department, as of 1957 and appear here as a guide to what might be considered reasonably normal periods of useful life, for tax purposes. The letter B indicates equal to life of building.

BUILDING AIR CONDITIONING AND HEATING EQUIPMENT

Air conditioning systems, over 20 tons	20	Louvers and screens, fresh air steel	15
Air conditioning systems, 5 to 15 tons	15	Manometers	15
Air conditioning systems, under 5 tons	10	Motors, synchronous and exciter set	20
Air diffusers	20	Motors, induction, indoor	20
Air filters, oil, self-cleaning	20	Motors, weatherproof, for outdoors	20
Air filters, dry cleanable	10	Oil burner equipment for heating systems	10
Air washers	10	Piping, refrigerant and other air conditioning	20
Air compressors for pneumatic controls	20	Piping, plumbing, brass or copper	B
Awnings	15	Piping, plumbing, cold water, iron	25
Boiler, oil burner and tank	20	Piping, plumbing, hot water or steam, iron	20
Compressors, refrigerating	20	Piping, plumbing, sewer, cast iron or vitrified	B
Condensers, shell and tube	20	Plumbing faucets and flushing valves	15
Condensers, double pipe	20	Plumbing, bathtubs, lavatories, toilet bowls	25
Condensers, evaporative	15	Pumps, chilled water	20
Coolers, water	20	Pumps, condenser water	20
Dehumidifiers	10	Pumps, condensate	20
Drums, purge or surge	20	Pumps, dehumidifier	22
Ducts and other sheet metal work	B	Pumps, evaporative condenser	15
Electric heaters, air conditioning	15	Pumps, suction, pressure and sump	13
Fans	15	Pumps, sump	25
Finned tube heaters, steam, water, cleanable tube	20	Pumps, well	25
Fire alarm systems	25	Radiators	25
Fire equipment, movable	20	Receivers, refrigerant	25
Gages	15	Regulators, suction or static pressure	5
Gas burner equipment for heating systems	16	Silica-gel beds	15
Grilles and registers, wall or ceiling type	20	Spray ponds	15
Grilles and registers, window units	15	Sprinkler systems	B
Heaters, booster	20	Tanks and vats, water, of metal	25
Heaters, electric	10	Tanks and vats, water, of wood	15
Heaters, gas	10	Thermometers, room type or recording	15
Heating systems, boilers and furnaces	20	Towers, cooling	15
Insulation, cold pipes and tanks	20	Valves, brass body, water or steam	B
Insulation, hot pipes and tanks	15	Valves, iron body, water or steam	20
Lighting systems, conduits and fittings	B	Valves, automatic expansion and by-pass	5
Lighting system wiring	20	Valves, solenoid	15
Lighting fixtures	15	Valves, water regulating	20
Louvers and screens, fresh air, copper	25	Ventilating louvers and doors	15

EQUIPMENT IN SPECIAL APPLICATIONS

The lives, in years, below apply to the business or manufacturing industry listed in parentheses

Air conditioning machinery (rayon)	17	Hot water heaters (laundries)	20
Blower system (breweries)	15	Humidifiers (bakeries)	15
Blowers, chip and refuse system (pulp and paper)	14	Humidifiers (leather products)	20
Blowers, heating and ventilating system (pulp and paper)	22	Humidifiers (tobacco)	15
Dust collectors (cement)	50	Humidifying and ventilating machinery (rayon)	15
Dust collectors (pulp and paper)	25	Humidifying system (textiles)	25
Fans, exhaust and ventilating (theaters)	15	Pipes, copper (acetic acid)	10
Heaters, heating and ventilating system (pulp and paper)	22	Pipes, rubber (acetic acid)	8
		Pipes, hard rubber (muriatic acid)	7
		Pipes, earthenware, duriron, lead (nitric acid)	2

EQUIPMENT IN SPECIAL APPLICATIONS (concluded)			
Pipes, lead (sulphuric acid)	10	Refrigerating equipment (packing houses)	15
Pipes (soap mfg.)	20	Refrigerating machinery (packing houses)	20
Pipe, black or galvanized (construction work)	4	Refrigerating systems (breweries)	20
Piping (breweries)	20	Refrigerating systems (hotels)	11
Piping, cold water (distilling)	25	Swimming pools (amusement parks)	20
Piping, condensate and hot water (distilling)	25	Ventilating equipment (furs and hats)	20
Piping, process equipment (distilling)	20	Ventilating systems (soap mfg)	15
Piping, steam (distilling)	25	Ventilators (leather products)	15
Pipe threading and cutting machines	10	Water coolers (offices)	10
Pumps, hot water circulating (dairy products)	24	Water softeners (laundries)	20

STEAM POWER EQUIPMENT (OTHER THAN PUBLIC UTILITIES)			
Ammeters, recording	15	Generators, 50 hp to 1000 kva, high speed, belt-driven	17
Ash and coal handling equipment	20	Generators, 50 hp to 1000 kva, low speed, direct conn.	25
Blowers and fans	15	Generators, 50 hp to 1000 kva, low speed, belt-driven	22
Boiler fittings	18	Generators, below 50 hp, ac	17
Boilers, over 50 hp, firetube, horizontal	20	Generators, below 50 hp, dc	14
Boilers, under 50 hp, firetube, horizontal	17	Heater, feedwater, closed type	25
Boilers, over 50 hp, firetube, locomotive	17	Heater, feedwater, open type	22
Boilers, under 50 hp, firetube, locomotive	14	Heaters, other than feedwater	22
Boilers, under 50 hp, firetube, portable	10	Pipes, cast iron, 2 to 4 inches	50
Boilers, under 50 hp, firetube, vertical	14	Pipes, cast iron, 4 to 6 inches	65
Boilers, over 50 hp, watertube, below 225 lb. pressure.	25	Pipes, cast iron, 8 to 10 inches	75
Boilers, over 50 hp, watertube, over 225 lb. press.	22	Pipes, cast iron, 12 inches and over	100
Boilers, under 50 hp, watertube, below 225 lb. press.	20	Pipes, concrete or masonry	20
Breeching and flues	22	Pipes, steel, under 4 inches	30
Chimneys, masonry	50	Pipes, steel, over 4 inches	40
Chimneys, steel, self-supporting, lined	35	Pipes, transite, 6 inches	50
Chimneys, steel, self-supporting, unlined	30	Pipes, wrought iron, 6 inches and larger	75
Compressors, portable	20	Pipes, wrought iron, under 6 inches	50
Compressors, stationary	25	Pumps, auxiliary	18
Condensers, steam, atmospheric	25	Pumps, centrifugal and rotary	20
Condensers, steam, surface	20	Pumps, direct acting	25
Conveyors, ash and coal	15	Pumps, gas	20
Economizers	15	Separators, steam	25
Engines, diesel and semi-diesel	22	Standpipes, concrete or steel	50
Engines, gas and gasoline	17	Tanks, concrete	50
Engines, steam, low speed	25	Tanks, steel	40
Fuel systems, pulverized coal	20	Tanks, wood	20
Gages, recording	25	Towers, cooling (frame)	15
Generators, over 3000 kva	28	Traps, steam	20
Generators, 1000–3000 kva	25	Turbines, steam	22
Generators, 50 hp to 1000 kva, high speed direct conn.	20	Wells, drilled and driven	40

BUILDINGS Rates for use when the building equipment is set up as a separate depreciation account			
Apartments	50	Hotels	50
Banks	67	Loft buildings	67
Dwellings	60	Machine shops	60
Factories	50	Office buildings	67
Farm buildings	60	Stores	67
Garages	60	Theaters	50
Grain elevators	75	Warehouses	75

AIR CONDITIONING, HEATING AND VENTILATING'S

Reference Section

Nuclear Radiation Detection and Measurement

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Within recent months significant changes have occurred in the field of nuclear engineering which are of tremendous potential significance to engineers in all fields. During the early years of atomic development interest centered on the so-called "pile" or reactor and its use as a means of producing fissionable material for military use. Subsequently, the reactor became prominent as a device for liberating energy for power purposes, either mobile — as in the two nuclear powered submarines — or stationary — as in the new central power plants. Throughout both the military and the power periods, however, the significance of the reactor was primarily with respect to its use of, or production of, fissionable materials.

When used for the above purposes the spent fuel or "ash" from a reactor constitutes a problem of the first order of magnitude. This material is highly radioactive. There is more radioactivity in the ash from a single reactor than in all the radium that has ever been mined. Thus the problem of waste disposal has been a very significant one and such disposal has been both a costly and a hazardous procedure.

Recently, however, a multitude of new uses have been found for this "waste" material and it now seems quite possible that — in the very near future — this formerly undesirable residue may become a much-needed and extremely valuable by-product. Processed radioactive "waste" now finds ever-growing use in three fundamental, different ways: (1) to provide "tracers" for following growth processes or checking mixing effectiveness, as with two air streams or with outlets of an air conditioning system. "Tagged" atoms of this type provide a most effective means of obtaining quantitative data on flow systems; (2) to act as thickness gages or as flaw detectors by means of radiation attenuation measurement; (3) to sterilize and safeguard bandages, food, and other materials that are subject to the action of undesirable living organisms. In this connection the heating and air conditioning engineer may develop an important application of radioactive material for use in purifying re-circulated air.

From the above considerations it should be evident that the detection and measurement of radiation may soon become a matter of extreme importance to heating and air conditioning engineers as well as to engineers in many other fields where as yet the impact of the nuclear era has not yet been manifested. The article which follows presents a summary of current information on this subject.

Nuclear Radiation Detection and Measurement

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In experimental investigations of nuclear radiation, or in surveys to determine the possibility of radiation intensities which may be hazardous to health, a first essential is to detect the radiant energy and to evaluate it both quantitatively and qualitatively. Radiation, regardless of type, is not subject to direct perception; its detection and measurement require indirect analysis of the effect which it has on materials which it strikes, is absorbed by, or is transferred through. This article summarizes the principles of detection and measurement and describes the basic experimental methods used for accomplishing these purposes.

For background on this subject and for definitions of special terms, refer to "An Introduction to Nuclear Radiation and to Nuclear Engineering" by the author in AIR CONDITIONING, HEATING AND VENTILATING'S *Reference Section*, July and September, 1956.

Most of the instruments used for radiation measurement are based on one of two effects experienced by matter which is irradiated. The first effect, ionization, occurs when any type of radiation (alpha, beta, gamma, X-ray, or neutrons) passes through a gas; the second, luminescence, occurs when certain materials, usually of the phosphor group, are directly irradiated. In the first case, measuring devices are designed either to count the number of atomic or nuclear particles which are received at the instrument or to evaluate the rate at which such particles deliver energy to the medium through which they pass. In the second case, energy cannot be evaluated, the instrument then acting solely as a counter to determine irradiation rate in particles per unit time.

Within the last decade great advances have been made in the development of more precise radiation measuring instruments. At present there are a very great number of different types of commercial instruments available, but it is interesting and important to note that, though they differ greatly in appearance and in mechanical or electronic arrangement, the basic principle is, in almost all cases, either measurement of ionization or of luminescence. The advances in instrument design which have occurred have thus been largely with respect to the use of new electronic means of increasing sensitivity and accuracy. Some of these devices, as the photomultiplier tube and the scaler, will be described briefly in subsequent sections.

Ionization

A given quantity of a particular radioactive material will, over a short time period, emit radiation (alpha, beta, or gamma rays) at a fixed rate. As this radiation passes through a gas at a fixed temperature and pressure, its ability to ionize that gas will be determined by the energy possessed by each type of radiation. Thus, for any one type of radiation, the amount of ionization produced will be directly proportional to the number of particles.

In air at standard conditions, for example, ionizing radiation strips orbital electrons from the atoms or molecules of the gas, leaving them as positive ions, the free electrons constituting negative ions. For each ion-pair formed the impinging particle loses 32.5 electron volts of energy. Hence, knowledge of the number of ion-pairs formed by a particle would permit direct determination of its energy.

Specific ionization is defined as the number of ion-pairs formed per centimeter of path. Since a charged particle in motion constitutes an electric current, it follows that, for particles having the same mass, those with greater charge will produce ionization more rapidly. For particles having the same charge, but different mass, the slow, heavier particles will produce a greater specific ionization because the time in which they remain in the region of influence is longer. As an indication of ionizing characteristics it may be noted that a beta particle, in air at atmospheric pressure, has a specific ionization of from 30 to 300 depending on its initial energy; an alpha particle emitted from a radioactive material will have a specific ionization of 40,000 to 100,000. As a rough approximation, the ionizing effect of alpha, beta, and gamma rays is as 10,000 is to 100 is to 1.

In some cases the charged particle interacting with an atom or molecule of gas will transfer some energy, but not sufficiently to produce ionization. In this event the atom will be raised to a higher energy level and will then undergo degradation to the stable state by emission of radiation in the form of fluorescence. The existence of fluorescence in a gas-type radiation instrument provides an indication of the presence of radiation, but does not permit evaluation of the amount.

Radiations in the form of charged alpha or beta par-

ticles produce ionization directly. Gamma rays and neutrons, however, do not possess a charge, hence cannot be responsible for direct production of ionization. When gammas interact with matter, they eject electrons as a result of photoelectric and Compton effects and it is these free, fast electrons, equivalent to negative ions, together with the ions they produce, which are detected and measured. Fast neutrons interact with hydrogen atoms to produce hydrogen recoils (fast-moving, positively-charged hydrogen atoms, or protons) and it is these recoils which then produce the ionization within the gas. Slow neutrons can be detected by having them interact with an isotope of boron. A result of the interaction is production of ionizing lithium ions and alpha particles which, by secondary effect, cause ionization of the gas molecules and thereby permit detection and measurement of the neutrons.

Once ionization has occurred, various methods are in use for recognizing and evaluating it; among these are voltage change, current flow (pulse or change), condensation (around ionized nuclei), crystal conduction, and photographic methods. Each of these will be given consideration in following sub-sections.

Voltage change. The simplest type of device for investigating ionization is a chamber (Fig. 1) containing air or some other gas and provided with two electrodes which can be connected to a battery or other source of potential difference. Since most gases are non-conductors of electricity, it follows that the potential difference between the two electrodes can be raised to a quite high value before discharge will occur.

Consider now that the battery is connected to the electrodes and a potential difference—less than the discharge value—established between them; the battery is then disconnected and so long as no current flows between the electrodes the potential difference will continue to exist and will maintain its initial value. In time, background radiation would cause sufficient ionization within the chamber to affect the voltage difference, but this time interval would be long as compared with the time required for use of the chamber as a radiation instrument. If ionizing radiation enters the chamber, the resultant negative ions would migrate to the positive electrode and the positive ions would migrate to the negative electrode, hence the potential difference between electrodes would decrease as a function of ionization. By measuring the rate of change of voltage it is thus possible to determine the rate at which ionizing radiation is entering the chamber. Note that the entering rate is for *quantity* of radiant energy rather than for *number* of discrete particles or protons.

The voltage change method of quantity measurement is the principle used in practice in the electroscope, discussed below.

Electric current (pulse). Referring again to Fig. 1 and considering the battery allowed to remain connected to the electrodes, if the impressed voltage is low, the ions formed will, due to entrance into the chamber of a charged particle, move toward the electrodes due to attraction between charges of opposite sign. But the low potential difference will not appreciably accelerate the ions as they pass through the electric field. During this

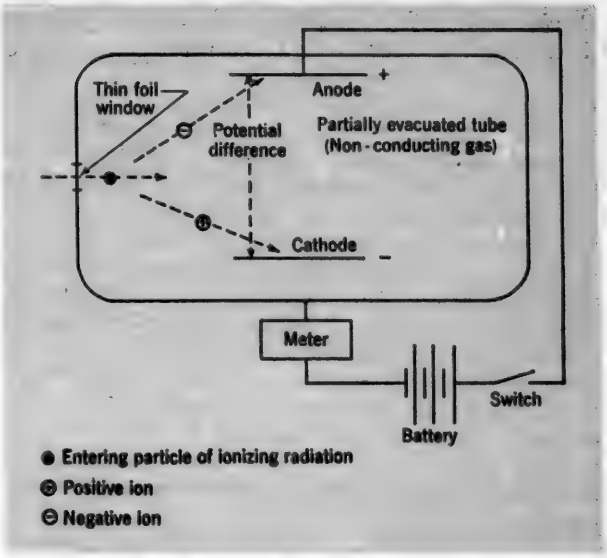


Fig. 1. Simple ionization chamber.

slow ion migration many re-combinations of ions will occur, so the ion reception at the electrodes will be much less than ion production in the gas. If, now, the voltage is increased, the accelerating effect of the field will reduce the time of migration. For some voltage range between 100 to 500 volts, the value depending on the particular system, the time will be so short that practically all ions produced by the charged particle will reach the electrodes. As a consequence of the ionic charges collected on the electrodes, a pulse of current will occur, the magnitude of the pulse being independent of the value of the voltage, provided the voltage is within the range discussed above. Thus each time an ionizing particle enters the chamber a pulse of current will occur. Provided the discrete particles, or photons, of radiation are received at sufficient time intervals, the chamber can then be used as a counting instrument for determining the rate at which particles are being received.

The current pulse method of particle counting is the principle used in the ionization chamber, treated later.

Electric current (change). If the potential difference across the electrodes of Fig. 1 is increased above the range described above, the negative ions (electrons) formed in the gas will be accelerated to a high velocity and will then produce secondary ionization in the gas as they move toward the positive electrode (anode). In this way the total charge reaching the electrodes will exceed the charge of ions originally formed by passage of the charged particle, hence amplification of the pulse will occur. As the voltage is increased, the acceleration will likewise increase. So, too, will the amount of secondary ionization. The magnitude of the pulse will therefore be a function of voltage and of primary ionization.

In an instrument of this kind, reception of a highly ionizing alpha particle will be indicated by a strong pulse, reception of a beta by a weaker pulse, and reception of a gamma ray by a very weak pulse. Thus the proportional characteristic of the pulse can be utilized in a measuring instrument, called a proportional counter, described in a subsequent section, for sorting particles and for separate counting of particular types of ionizing radiations.

Condensation nuclei. In contrast to the electrical methods described above, ions can also be counted by causing them to form the core of water droplets which are large enough to be seen. This is done by using a saturated gas in the ionizing chamber and then providing means for isentropically expanding the gas (expanding under thermodynamically reversible conditions and without heat flow in or out) so that the vapor becomes supersaturated. Since supersaturation is an unstable state, condensation starts immediately and droplets form around the ions as nuclei. The process is similar to that which occurs in the process for inducing rainfall called seeding.

The condensation method is useful both as a means of counting impinging particles, by counting the vapor trails through the gas, and for determining the initial energy of the particle, by counting the droplets which make up a given trail. The cloud chamber, treated below, is a laboratory instrument based on the condensation principle.

Crystal conduction. This method utilizes an electrically non-conducting crystal placed between electrodes. When irradiated with ionizing radiation, the crystal becomes conducting and transmits a pulse just as does the gas in the previously described methods. The advantage of the method is said to be the very short pulse time that permits counting at a more rapid rate. Disadvantages are the lack of inexpensive crystalline materials which can be used under normal conditions of temperature and pressure. Crystal conductor instruments thus offer interesting potentialities, but are not yet at a satisfactory stage of development to permit commercial use.

Photographic methods. Although photographic plates were used in the original investigations of X-rays and of radioactivity, this method of detection was long considered practically obsolete because of various difficulties and uncertainties. Recently, however, special nuclear emulsions have been developed and new interest has arisen in the photographic method. The new emulsions are very much thicker (25 to 2000 microns) than those used in ordinary photographic film and they contain greater percentages by weight of silver halide of very small (one two hundred thousandth of a centimeter) grain size. With these emulsions, the individual grains of silver can be counted and from studies of number and spacing of the grains in a given track it is now possible to determine the nature and strength of the impinging radiation.

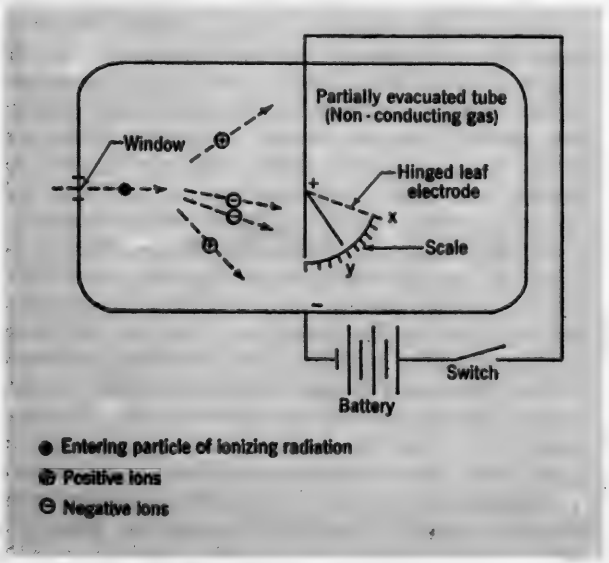


Fig. 2. Diagram of electroscope.

When the photographic method is used for determination of quantity of radiation received, the underlying assumption is that the quantity of photochemical effect is directly proportional to the quantity of irradiation and independent of the irradiation rate. Experiment has verified this assumption for alpha, beta and gamma radiation and it is known as *the reciprocity law for photochemical reactions.*

Luminescence

The second most important principle of radiation detection is based on the fact that absorption of radiation by certain target materials, known as phosphors, leads to excitation of the atoms. Subsequent emission of radiation occurs in the wave lengths corresponding to light during the interval in which the atom returns to a stable state. Thus zinc sulfide, diamond, and barium platinocyanide are all solid materials which evidence luminescence when irradiated by alpha particles. Zinc sulfide crystals, adulterated with a small quantity of copper, are dusted on glass. Each time an alpha particle strikes the target a brief flash of light evidences the return to stability of the excited target atom. By providing proper magnification, approximately 30 power, the individual flashes can be seen as scintillations and a count of these will determine the rate at which alpha particles are striking the target. Since zinc sulfide is relatively insensitive to beta and gamma radiation, it follows that this counting procedure is particularly effective when it is desired to obtain an alpha count from a mixed stream of incident radiation. Since each scintillation is due to a single target atom, the recovery time is decidedly less than in most radiation instruments, hence its sensitivity is greater. An average excited atom returns to a stable state in approximately 10^{-8} sec. Counting rates of several thousand flashes per sec are common.

The scintillation procedure can also be used for counting betas and gammas provided proper selection is made of the target material. For this purpose various organic compounds, as naphthalene, anthracene, scheelite, stilbene, phenanthene, diphenyl, and thallium-activated sodium iodide are used.

When used for neutron counts the luminescent method utilizes recoil protons from anthracene. Slow neutrons are counted by utilizing phosphors containing boron or lithium and depending on ions from the secondary reaction to develop the required scintillations.

Instruments utilizing the principle of luminescence are discussed below under scintillation counters.

The Electroscope

The electroscope is a precise laboratory instrument which operates on the voltage change principle, discussed in *Voltage Change,* above. Fig. 2 shows diagrammatically a typical electroscope. It consists of a closed chamber. The walls act as the negative element. The positive element consists of a rod which terminates either in two gold leaves, movable with respect to one another, or in aluminum leaves, one fixed, the other movable. When a

potential difference is established between the elements, the leaves separate due to repulsion of like charges and will maintain their separation so long as the charge is unaltered. Thus in Fig. 2, for fully charged conditions, the aluminum leaf would move out to a position identified on the scale as x.

When ionizing radiation is emitted by a radioactive sample within the chamber, the negative ions (electrons) migrate to the anode leaves, partially reducing their charge and thus lessening the Coulomb force which tends to separate the leaves. The rate of collapse, that is, the rate of reduction of potential difference, is then proportional to the *rate* at which ionizing radiation is received, whereas the total change in position of the movable leaf, as from x to y in Fig. 2, is indicative of the quantity of ionizing radiation received.

Since the ionizing effect of alpha particles is very much greater than either beta or gamma, it follows that use of an unshielded radioactive sample within the electroscope chamber will give a result primarily attributable to alpha radiation. If a beta measurement is desired, the sample should be shielded with 0.01 cm of aluminum, whereas for a gamma measurement the shielding would have to be of the order of 2 to 3 mm of lead. In some cases gamma measurements are made by placing the radioactive sample outside of the electroscope and constructing the entire chamber of an adequate shielding material.

The Ionization Chamber

This type of instrument, operating on the principle discussed in *Electric Current*, above, differs from the electroscope primarily in that external means are used to maintain the potential difference between electrodes. Readings are determined by a count of current pulses. Each count corresponds to reception within the chamber of a single particle, or photon, of radiation.

Referring to Fig. 3, particles enter the chamber through a gas-tight foil-covered window which is also necessary to provide electrical shielding of the instrument. The resultant ions from each particle move rapidly to the electrodes where they give up their charge and momentarily reduce the potential difference. A brief current then flows as the battery re-establishes the potential difference between electrodes. While the current is flowing, a small voltage drop occurs across the resistance, R. This potential difference is amplified by electronic means and produces a pulse which can be either heard or electronically counted. The pulse increases with the amount of ionization produced, hence differentiation is possible among various types of incident radiation. By using a complicated electronic auxiliary known as a pulse counter or *kicksorter*, the pulses can be separated into various classes determined by size and these groups then separately counted. This permits use of an ionization chamber to separately count each of the different types of radiation which enter it.

A typical ionization chamber can count impingements from alpha particle reception at a rate of over 10,000 per sec. In cases where the irradiation rate exceeds this value, use is made of an electronic device known as a scaler; this permits fixing a selective constant such that every second, eighth, sixteenth, or sixty-fourth pulse will be counted.

In some cases ionization chambers are adapted for use in measuring quantity of radiation rather than for counting particles. When this is the purpose, the resistance, R, of Fig. 3 is increased to a value such that the time required for a pulse to decay will exceed the time interval between reception of impinging particles. Under these conditions an average current and voltage will exist at R and by use of proper electrical instruments the average potential difference across the electrodes can then be converted to rate of reception of radiant energy. Note that reference is now to *quantity* of energy and not to *number* of incident particles.

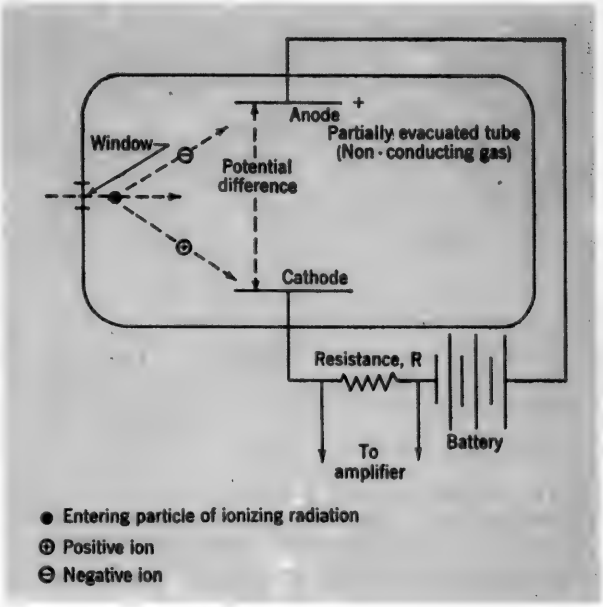


Fig. 3. Current pulse or ionization chamber.

When an ionization chamber is designed specifically for the counting of alpha particles, it is preferably kept small, since alpha particles travel only a short distance in air. If the electrodes are placed within a centimeter of one another, the alphas will be allowed to fully dissipate their energy in the process of ionization, but the more penetrating betas and gammas will traverse the region with inappreciable effect. Betas are counted by using a thin aluminum window which prevents alphas from entering the chamber.

The counting of gamma photons requires rather special equipment. A thin lead window excludes both alphas and betas and use of a heavy gas, as Refrigerant-12, in the ionization chamber assists in providing the liberation of the fast electrons needed to produce ionization.

For counting of neutrons there are two common procedures. First, by using boron trifluoride as the gas within the chamber, interaction will occur between slow neutrons and the isotope $_5B^{10}$. One consequence will be release of an alpha particle which will then serve to produce the required ionization. Second, by coating the inside surface of the chamber with $_5B^{10}$, the same interaction will occur with like secondary production of ions.

The Proportional Counter

This type of instrument operates on the current change principle as described in *Electric Current (change)*, above. The primary ions are accelerated toward the elec-

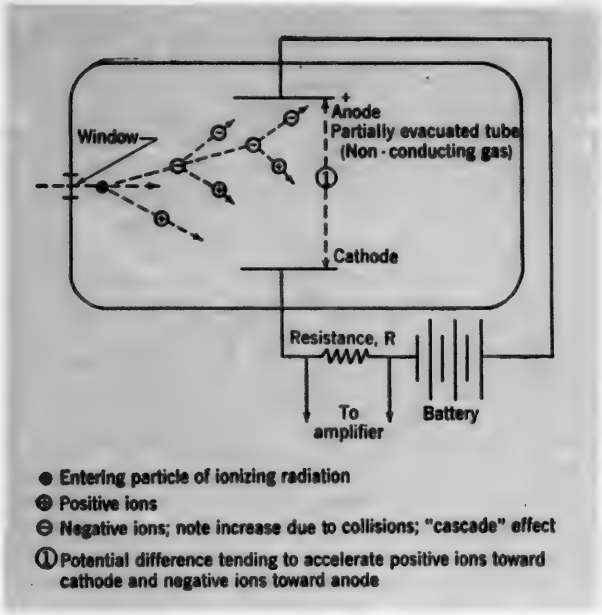


Fig. 4. Proportional counter.

trodes with production of secondary ionization (Fig. 4) due to collisions with atoms or molecules en route. The result is an *avalanche* or *cascade* of electrons at the collecting electrode. For each ion-pair formed by the incident radiation there will be a multiple of negative ions received at the anode. This multiple is called the *gas-amplification factor* and may be of the order of 100,000 to 1,000,000. For a fixed value of potential difference, the gas-amplification factor will have a fixed value and the size of the amplified pulse will then be proportional to the energy possessed by the impinging particle of radiation.

The Geiger-Muller (G-M) Counter

The Geiger-Muller counter is one of the most widely used methods for detecting radiation. It operates on the same general principle as the ionization chamber, but the potential difference between electrodes is greater, in the range from 800 to 1500 volts. Due to the higher voltage, the production of secondary ions is so great that the resultant avalanche gives a pulse size which is practically independent of the number of primary ion-pair. The gas-amplification factor is so large, about a hundred million, that external amplifying devices may not be necessary.

A typical G-M tube (refer to Fig. 5) consists of a small tungsten wire, approximately 0.03-mm dia, acting as the anode and located on the axis of a tube. The tube may be glass with a contained metal cylinder to act as the cathode, or the interior surface of the glass tube may be covered with a thin layer of electrical conductor so that the wall itself acts as the cathode. Usually the tube is filled with a gas, as argon, or mixture of gases and its pressure is reduced to from 2 to 10 cm of mercury.

When an ionizing particle enters the tube, the cascade of negative ions moves very rapidly toward the wiry anode. The positive ions, of greater mass, move more slowly toward the cathode and set up a space charge near it. When the positive ions reach the cathode, they may be responsible for liberation of some free electrons which then travel toward the anode and thereby prolong the time interval during which the pulse occurs. But an extended pulse time obviously reduces the counting accuracy, since ionizing particles which enter the chamber while a pulse is in progress may serve merely to extend that pulse rather than to trigger a different one.

To obviate the above difficulty, various means are employed for quenching each pulse and thereby preventing successive pulses from running together. In self-quenching G-M tubes the mixture of gases consists of approximately 90% argon to provide a low potential for starting the pulse, with approximately 10% of some polyatomic vapor such as ethyl alcohol, methane, or ethane to provide rapid quenching of the pulse. Thus the organic admixture serves to shorten and resolve the pulse, hence to increase, up to about 10,000 particles per sec, the number of pulses that are sufficiently distinct to be counted.

By special design, G-M counters can be made for counting of any type of radiation particle or photon. Alpha particles are the most difficult to isolate, particularly as they necessitate a very thin window in the chamber in order to allow penetration. G-M counters can be adapted for counting neutrons by the same means that are used for ionization chambers.

Measurement of charge on an alpha particle. A check on the value of the electronic charge can be obtained following the method of Rutherford and Geiger, by means of a Geiger counter. These two scientists placed a radioactive sample near the window of a G-M counter and found that 3.57×10^{10} alpha particles were emitted from a gram of radium in one sec. They next determined the rate of increase of charge on an exposed electrode, as in an electroscope, and by division determined the charge per particle to be 3.19×10^{-19} coulomb. Remembering that an alpha particle is a doubly-charged helium ion, it follows that the alpha charge is twice the standard electronic charge. The G-M results thus compare favorably with the value of the electronic charge as determined by Millikan's oil drop experiment.

Counting efficiency and instrument calibration. In using a Geiger-Muller counter, a proportional counter, or an

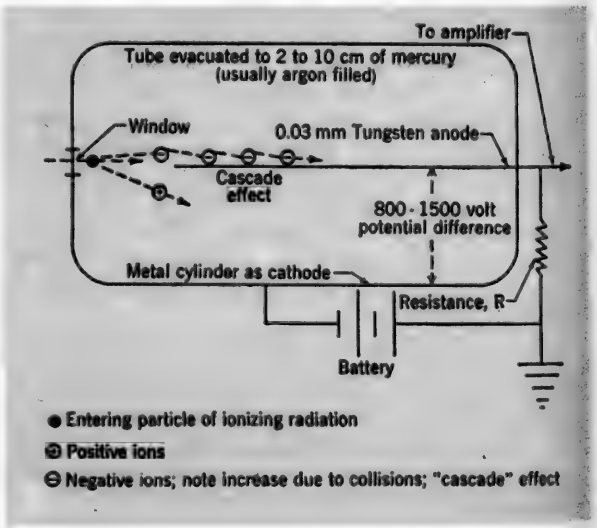


Fig. 5. Geiger-Muller (G-M) counter.

ionization chamber, it must be recognized that the reading obtained is of direct significance only for purposes of comparison with readings from other and similar sources. The actual count will differ from the number of disintegrations of the radioactive material for a number of reasons. These include the geometry of the system, determining what fraction of particles are discharged in the direction of the chamber window; scattering either before reaching the window or after passing through it; and absorption in the material of the window.

To calibrate a G-M tube for beta counting, a standard sample of radioactive material is obtained from the Bureau of Standards. The sample consists of an electrolytically deposited 1 mg per sq cm layer of Pb^{210} in PbO_2 on a palladium-coated silver disc. The calibration is valid only when the instrument is used to count betas having the same energy as the standard, 1.17 Mev. However, errors due to energy differences are not great and for most comparative radiation surveys they can be neglected.

Calibrating procedures for G-M tubes have also been established for the comparative counting of alpha rays, gamma rays, and X-rays from K-capture. In most cases, however, if a beta is emitted along with other types of radiations, the beta count will provide the most accurate means of evaluating the disintegration rate.

The accuracy of an average G-M counter for measurement of absolute disintegration rates is of the order of 10%. New units, known as 4 pi counters, the radioactive sample being placed within the counter, have accuracies of approximately 98%.

The Cloud Chamber

The principle of the cloud chamber, *Condensation Nuclei*, has been discussed above. A typical instrument designed to operate on this principle is shown diagrammatically in Fig. 6a. After ionizing radiation has entered the chamber the saturated air is isentropically expanded by suddenly withdrawing the piston. The supersaturated water vapor then condenses on the ions as nuclei and the resultant droplets can be photographed by stereoscopic cameras to obtain a three dimensional record of the path followed by the impinging particle. Subsequently, the charged droplets are removed from the cylinder by application of an electric field, driving each droplet to the electrode of opposite sign. The instrument is then ready for re-use.

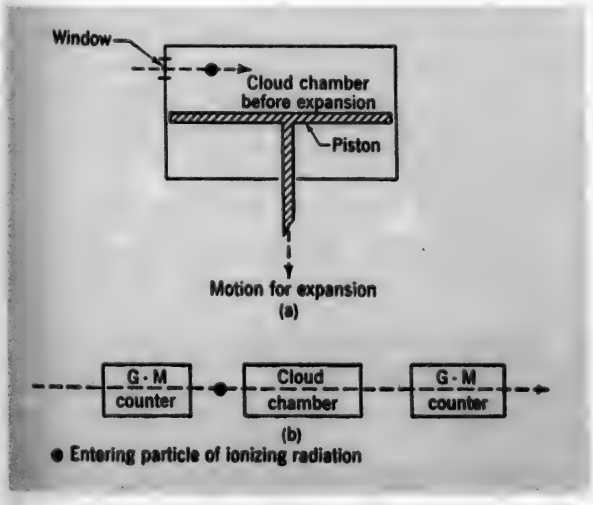


Fig. 6. (a) Cloud chamber, (b) G-M, cloud chamber automatic series.

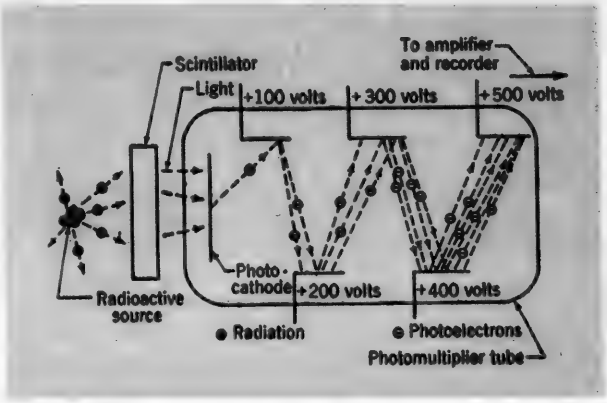


Fig. 7. Scintillation counter with photomultiplier.

By placing a cloud chamber between electro-magnets, the impinging radiation can be caused to follow a curved path which will disclose the sign of its charge.

By investigating the difference in appearance of the tracks, it is possible to determine the type of impinging particle. Alpha particles, having a very high specific ionization, produce broad continuous line tracks, whereas light, fast particles produce thin discontinuous tracks made up of small droplets which seem to be beaded along the path of the particles.

To be effective, a cloud chamber must undergo expansion very shortly after an ionizing particle has entered it. But the chamber provides no means of determining the presence of such a particle, hence many expansions and photographs may be made without obtaining any record of radiation. To avoid this difficulty the cloud chamber is sometimes placed between two G-M counters (Fig. 6b). When radiation passes through both counters, it must necessarily have passed through the cloud chamber. The pulses of the two G-M counters are then used to automatically cause expansion in the chamber and thereby make visible the train of ions left in the wake of the ionizing particle. The tracking of alpha and beta particles occurs as a result of condensation on primary ions, but gamma particles can only be identified in terms of secondary ionization caused by electrons released due to either photoelectric or Compton effect.

The Scintillation Counter

A modern radiation measuring instrument based on the principle of luminescence consists essentially of a phosphor so arranged within the instrument that the radiation which it emits as light will be directed to the photocathode of a multiplier tube (Fig. 7). Incidence of light on the photocathode is responsible for ejection of electrons by photoelectric effect. These electrons are then accelerated by an electric field to a dynode where a greater number of photo-electrons are ejected. The process is repeated a number of times and the magnification of electrons built up to a large value. Assuming four electrons ejected from a dynode for each one striking it and considering a photomultiplier with ten dynodes, there would be a million electrons finally received for each one initially ejected from the photocathode. The combination of phosphor with photomultiplier with amplifier

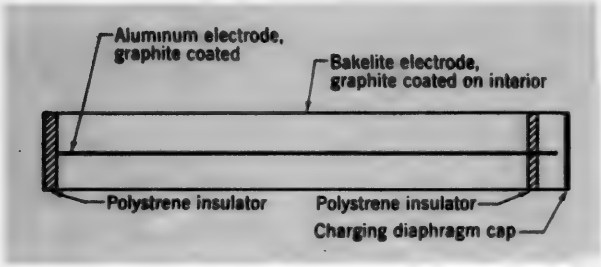


Fig. 8. Personnel pocket impinging chamber.

constitutes a modern version of the scintillation counter.

When scintillation counters are used for beta or gamma radiation, the luminescent material consists of thick crystals which must also be colorless and transparent in order to transmit the flashes of light. Gamma radiation directed into such phosphors as naphthalene or sodium iodide causes production of electrons by the Compton effect. These electrons then cause the ionization which is responsible for luminescence.

Instruments for Personnel Protection

In order to provide maximum protection to personnel from the hazards of excessive radiation, three types of monitoring procedures are in common use; these include area monitoring, survey monitoring, and personnel monitoring.

Area monitoring is carried out by placing standard radiation measuring instruments, as ionization chambers or G-M counters, in strategic positions in rooms where a radiation hazard might occur. A typical example is the installation of a G-M counter in a doorway, the unit so arranged that a warning signal will be given if anyone passing through the doorway shows undue radioactivity.

Although instruments for area monitoring all operate on principles which have already been discussed, the names of such instruments are sometimes extremely confusing—as *Cutie Pie, Zeus, Zeuto,* and *Monitron.* A *Cutie Pie* is a widely used ionization rate meter intended for detecting high level gamma fluxes. A *Monitron* is an alarm-sounding instrument for fixed position area monitoring. In area work a G-M tube is used for low level gammas as well as for alpha and beta radiation. For fast neutrons a proportional counter is favored. whereas for slow neutrons a B^{10} lined ionization chamber finds widest use.

Survey monitoring uses essentially the same type of instruments as for area work, but they must be portable and are often equipped with batteries to provide the required potential difference.

For personnel monitoring the situation is somewhat different, as the instrument must be light, inconspicuous, and accurate. It should preferably give some indication of the effect rather than the amount of radiation. Thus, though most instruments measure radiant flux, it is desired to convert this reading to roentgen equivalent physical (rep) in order to determine the ionizing effect of the radiation when absorbed in tissue. A second desired conversion would be to roentgen equivalent man (rem) in order to assess the actual biological hazard associated with the radiation, but this conversion cannot be built into the instrument since biological damage is a function of the location in the body where the hit occurs. The fact is that single-hit and multiple-hit damage are characteristics of the tissue location and type rather than of the type or energy associated with the incident radiation.

The three portable instruments most widely used for personnel monitoring are discussed in the paragraphs which follow:

Pocket ionization chamber. This type of instrument (Fig. 8) resembles a fountain pen in size and shape and consists of a chamber which is an air condenser charged to 150 volts. The anode is an aluminum wire coated with graphite which is insulated from, and coaxial with, the chamber. The interior of the chamber walls is likewise graphite coated, so it acts as the second electrode. The unit is fully charged before use, but, as gamma radiation enters the chamber, the resultant ionization decreases the potential difference between electrodes. At the end of the day the unit is placed in an electrometer and the voltage reduction measured. Since voltage loss is proportional to quantity of radiation entering, the method permits determination of the dosage of radiation received.

The usual scale ranges of pocket ionizing chambers are 0.2, 10, 50, or 100 roentgen. The chamber volume is approximately 5 cc, the size 0.5 by 5 inches, and the weight, 1 ounce. Units of this type are very dependable, but, since the information that they give may be of the utmost importance, they are usually worn in pairs as a protection against mis-reading of one due to possible discharge through the electrode insulator.

If boron lined, the same unit can be used for determination of slow neutron flux.

Pocket dosimeter. A typical dosimeter (Fig. 9) is essentially the same in appearance as a pocket ionization chamber, but it is self-reading, hence need not be taken to an electrometer at the end of the day. The elements consist of the usual co-axial wire anode and the cylinder as a cathode. In this case, however, a metal-coated, quartz fiber is connected to the anode so that it receives the same charge. Since the fiber is flexible, the effect of charging the instrument is to set up coulomb forces of repulsion between the wire and the fiber, thus displacing the fiber by an amount which is proportional to the voltage.

As ionizing radiation enters the chamber, which has a volume of 2.5 cc, the potential difference between electrodes decreases, hence the fiber tends to return to its undisturbed state. A calibrated scale is placed near the fiber. A compound microscope fitted in one end of the cylinder permits direct reading of the scale. hence of the radiation dosage.

The pocket dosimeter is an integrating instrument for determining the total quantity of ionizing radiation received in a given time. The usual scale calibration gives

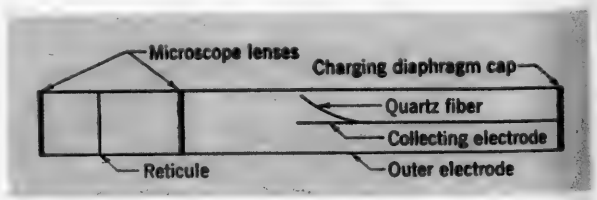


Fig. 9. Pocket dosimeter.

the number of rep absorbed by the instrument in a given time. From this value one can calculate the rep absorbed by the person during the same time interval. Scale ranges are 0.2, 10, or 50 roentgen. The instrument is ordinarily used for measuring fluxes due either to beta or gamma radiation. When used for either alpha or low power beta radiation, it is equipped with a small thin window to reduce the loss due to absorption. For use with slow neutrons the inside of the chamber is coated with boron.

Film-badge meter. A disadvantage of the instruments described above is that they do not permit keeping a permanent direct record of radiation dosage. This difficulty is overcome by a third type of personnel monitoring device known as a film badge. Two, sometimes three, films of different sensitivity are placed in series within the badge and a thin (1 mm) cadmium shield is placed over part of the film. Incident alpha and beta radiation is absorbed by the cadmium, but this shield both transmits gamma radiation and acts as a source of additional gamma rays. The unshielded part of the badge (the film being protected by a very thin window) registers betas and some weak gammas. Where neutron flux is also present a third layer of film is used; the part of the third layer which is protected by the cadmium shield records only recoil protons from the penetrating fast neutrons, but the unshielded portion of the film will show both proton tracks from slow neutrons as well as proton-recoil tracks of the fast neutrons.

Development of the exposed films and interpretation of the results is a painstaking task, hence film badges are not ordinarily used in localities where the radiation hazard is great enough to require daily personnel checks. Under customary usage, badges are developed weekly. The range of such badges is from 0.5 to 10,000 roentgen in multiple film pack. In the range from 20 to 3000 mr the photo density is of the order of 1.6, whereas in the range from 500 to 20,000 mr the photo density is closer to 2.5.

Comparison of Detecting and Measuring Instruments

By way of summary, the particular characteristics of the four major types of radiation instruments will be reviewed: Ionization chambers operate with potential drop across the electrodes of the order of 100 volts. The gas amplification factor is unity, so the signal requires considerable amplification external to the chamber before it can be recorded. For personnel monitoring this type of instrument is particularly effective because it establishes a linear relationship between the energy of the incident radiation and the quantity of ionization produced. Since biological damage is proportional to energy absorption for a given type of radiation, it is evident that an instrument of this type can be readily calibrated in terms of reps. The principal disadvantage of this instrument is the high resistance (10^{12} ohms) which must be maintained.

Proportional counters operate with relatively high voltage between electrodes (possibly 3000 volts) and with a gas-amplification factor such that the signal emitted from the chamber may be 1000 times stronger than that from the instrument described above. Since the signal is proportional to the number of primary ions, it is possible to identify differences due to different types of ionizing radiation. Less external amplification is required with a proportional counter and the possible count rate is also much greater than that of an instrument with unit gas-amplification.

The G-M counter provides a signal approximately 100 times stronger than that of a proportional counter, hence a relatively simple and inexpensive sensing and recording circuit can be used. This instrument is some 100 times slower than a proportional counter and cannot effectively separate different types of radiation, but due to low cost it is the most widely used type of radiation measuring instrument.

The scintillation counter is particularly useful as a gamma detector, since for this purpose it is some 50 times more sensitive than either a proportional counter or a G-M tube. By use of a photomultiplier this type of counter delivers enough electrons to a collecting electrode to provide a signal of approximately 0.02 volt. The signal is then amplified and recorded. Scintillation counters are over 400 times as fast as G-M tubes, but in the present state of development have the disadvantage that the photomultiplier tubes are subject to various kinds of external influence.

Air and Water Contamination

Public attention has often been called to the fallout hazard associated with the testing of nuclear weapons. A potential peacetime fallout and contamination hazard of even greater importance is that associated with the increasing industrial use of radioactive isotopes. In the event of an industrial radiation accident there would be possibility of contaminating both air and water supply. The National Radiation Protection Committee has established 2.2×10^{-3} beta or gamma disintegrations per min per milliliter as the maximum permissible concentration in either water or air. For alpha emitters, the maximum permissible limit is set as 2.2×10^{-3} for water, but 1.3×10^{-5} disintegrations per min per milliliter for air.

The seriousness of a possible large scale radiation accident is evident when one realizes that the presence of dangerous concentrations of radiation cannot be recognized by man's senses. It is only when the biological destruction has occurred that one can know that he has been exposed. As a protection against such hazards many American cities now maintain continuous monitoring of the radiation count in the water supply. The usual equipment consists of an instrument operating on the principle of the G-M counter with associated electronic and mechanical means of providing a permanent and continuous record of the count.

The "Human Counter"

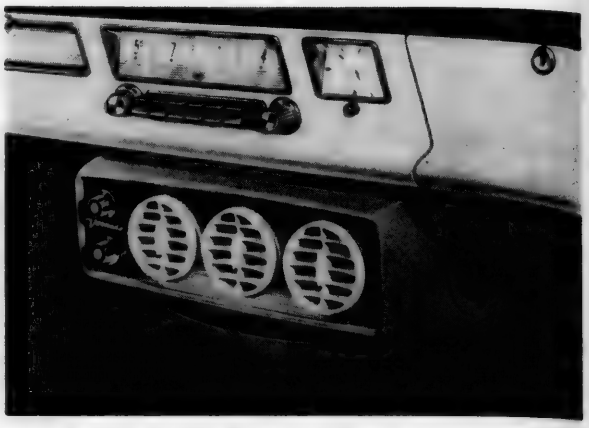
During 1955 the Los Alamos Scientific Laboratory announced successful use of one of the largest and most interesting scintillation counters yet to be developed. The unit consists of a six foot long cylindrical tank twenty-eight inches in diameter. The walls of the tank contain a liquid which scintillates on reception of gamma radiation. Scintillations are amplified by 108 photomultiplier tubes installed in the outer wall. The cylinder is surrounded by a 10-ton protective lead shield.

The subject to be investigated is placed bodily in the cavity of the cylinder and sensitivity of the system is so great that gamma measurements can be made with subjects whose internal radiation is still below the permissible level.

Air Conditioning Market Expanding with

Car and Truck Cooling

Air conditioning units for car and truck cooling are expected to reach the million mark by 1960. Here is a discussion of these units dealing with their manufacture, installation, and application. The information is based on material supplied by and with the cooperation of Motor Age, a Chilton publication.



Typical dash-mounted automobile air conditioning unit. Photo, The O. A. Sutton Corp., Inc.

LIKE the beanstalk that sprouted overnight, the market for automotive air conditioning is zooming upwards. A few short years ago, in 1953, less than 65,000 units were sold. Last year 300,000 air conditioners turned up in cars and trucks to keep passengers and drivers in cool comfort and good humor.

Industry sources say this year will go even higher—to the half-million mark. And by late 1959 or 1960 it is expected that over a million automotive air conditioners will be sold in any 12 month period.

Who is making these units and who is installing them? And what about servicing them?

At the present time, close to 6 out of every 10 units sold have been made by car manufacturers. Many of these units have been installed in the factory. They are put in the car as it proceeds down the assembly line much in the manner that a car radio, heater, or other optional accessory is installed. Units not installed in the factory and yet made by car manufacturers are available for installation by the car manufacturers' dealers.

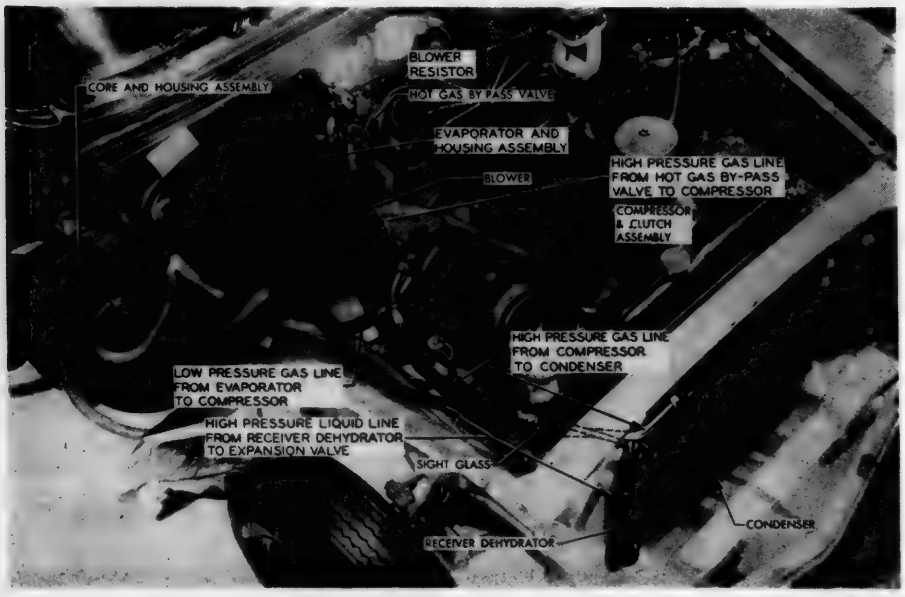
The remaining percentage of manufactured air conditioners falls to the independent makers of units for cars and trucks. At last report, there were over two dozen of these firms doing business, a number of them coming into being in the last year or two to meet the rising demand for air conditioners on the highway.

Installation of the independent maker's wares is usually done by the garageman or by the refrigeration service engineer who expanded his regular air conditioning service to include car units.

The refrigeration specialist has assumed a very important role here because of his everyday knowledge of air conditioning principles and service. Often you will find this specialist entering into a working agreement with the new car dealer or garageman for customer service and installation.

As would be expected, automotive air conditioners follow closely the makeup of regular room air conditioners as to working principles. Naturally, allowance must be made for the adaptations for a car engine and operating conditions, but the main components of compressor, evaporator, and condenser are still there.

For cars, installation systems are of two types. The evaporator is either located in the trunk, or it is located near the instrument panel and dashboard. In this


BLOWER RESISTOR
CORE AND HOUSING ASSEMBLY
HOT GAS BY PASS VALVE
EVAPORATOR AND HOUSING ASSEMBLY
BLOWER
HIGH PRESSURE GAS LINE FROM HOT GAS BY-PASS VALVE TO COMPRESSOR
COMPRESSOR & CLUTCH ASSEMBLY
HIGH PRESSURE GAS LINE FROM COMPRESSOR TO CONDENSER
LOW PRESSURE GAS LINE FROM EVAPORATOR TO COMPRESSOR
HIGH PRESSURE LIQUID LINE FROM RECEIVER DEHYDRATOR TO EXPANSION VALVE
SIGHT GLASS
CONDENSER
RECEIVER DEHYDRATOR

Under-hood view of forward-mounted-evaporator type automobile air conditioning system showing component arrangement and connections.

case, the controls and blower are usually in a dash-mounted box with the evaporator connected through the car's firewall. Where the air conditioner has its evaporator located in the trunk, cool air is generally forced upwards through the package shelf of the rear seat by means of plastic conveyor tubes.

With either the trunk-mounted or the forward-mounted evaporator, both the compressor and condenser are located in the same spots. The condenser is located forward of the car's radiator, still under the hood, and the compressor is mounted to the car's engine. The compressor operates by means of belts connected to the crankshaft pulley.

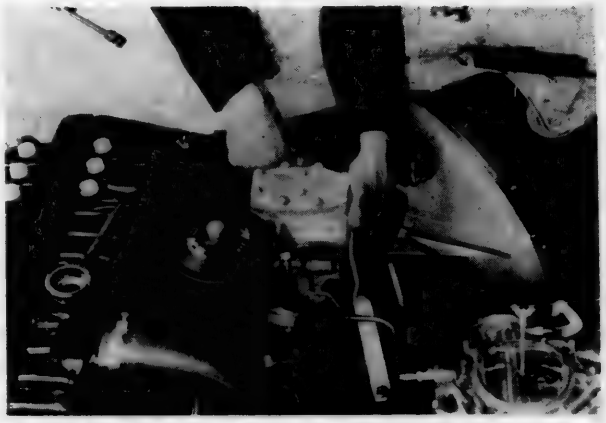
One manufacturer's specifications include the following items. Freon 12 is used for charging gas. Fan motor is 3 speed, series wound, 1/20 hp. Unit has an air volume capacity of 250 cfm, and is available in 6 or 12 volt models. High speed on blower is 2600 rpm; medium speed 2400; and low speed is 2100 rpm. Unit is housed in a plastic case that measures approximately 15 inches wide, 7 inches high, and 10 inches deep.

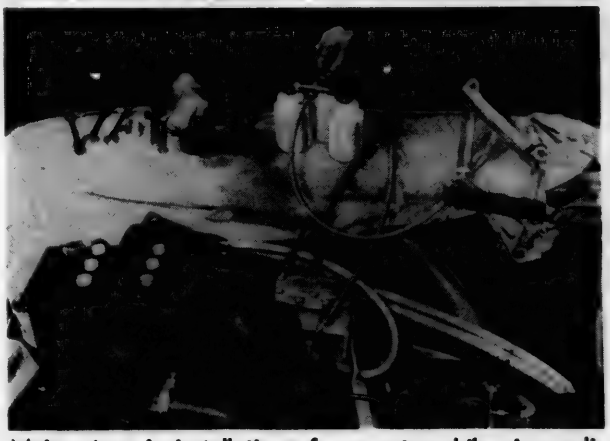
In the case of truck air conditioners, all three units, condenser, evaporator, and compressor, are located in one package which is mounted on the truck cab's roof or to the rear of the cab. In this type, the compressor operates from its own small engine and does not rely on the truck's engine for power.

A number of cars with air conditioners are equipped with some special equipment. This was installed at the factory in most cases at the same time the air conditioner was put in. This equipment includes such items as heavy duty shock absorbers, larger radiators, higher capacity batteries, generators, regulators, and the like. Also available is a suction-operated deodorizing device for the control of odors encountered on the highway.

One of the trends in automotive air conditioning units is the use of flexible hoses to replace feed lines previously made of copper tubing. Air ducting in some late model cars is being combined with heater ducting. And finally, magnetic clutches used in conjunction with the compressor are becoming standard equipment. The clutch is used to disengage the compressor when the air conditioning unit is not in use, thereby removing any additional load from the car's engine.

There is also available from an independent manufacturer an "install-it-yourself" automotive air conditioner including cooling section for under-dash or in-trunk location. Installation time is given as 3 to 4 hours, and units are claimed to fit most 1951 to 1957 models of cars and trucks.





Major steps in installation of any automobile air conditioning system. (Top) Service man attaches compressor to engine with bracket. (Center) Condenser coil is set in front of the radiator. (Bottom) System is charged with Freon gas. Installer attaches necessary gages, punctures gas cans with a special manifold, and feeds charge into system. Photos, The O. A. Sutton Corp., Inc.

Cab-mounted truck air conditioning package includes condenser, evaporator, compressor, and 4-cycle, one-cylinder gasoline engine. Photo, D. W. Onan & Sons Inc.

Quick Solution of Fan Equation

D. S. DAVIS

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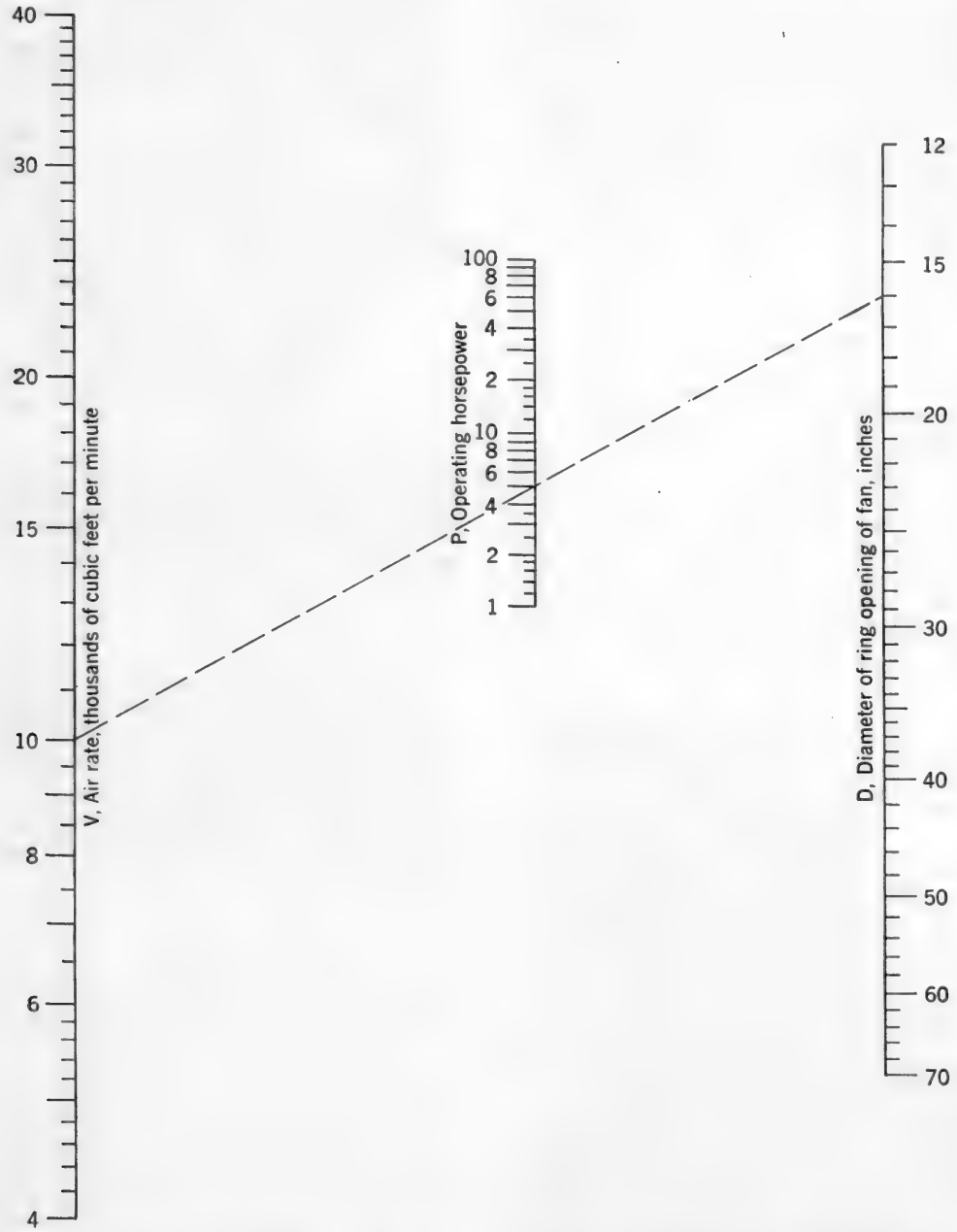
Fan power, capacity, and size are related by the equation:

$$P = 3.24 \times 10^{-7} \times V^3/D^4$$

where P is horsepower to drive theoretically perfect fan, V is air rate in cfm for free air conditions, standard air, and D is fan opening diameter in inches.

The accompanying nomograph permits this equation to be solved conveniently and accurately.



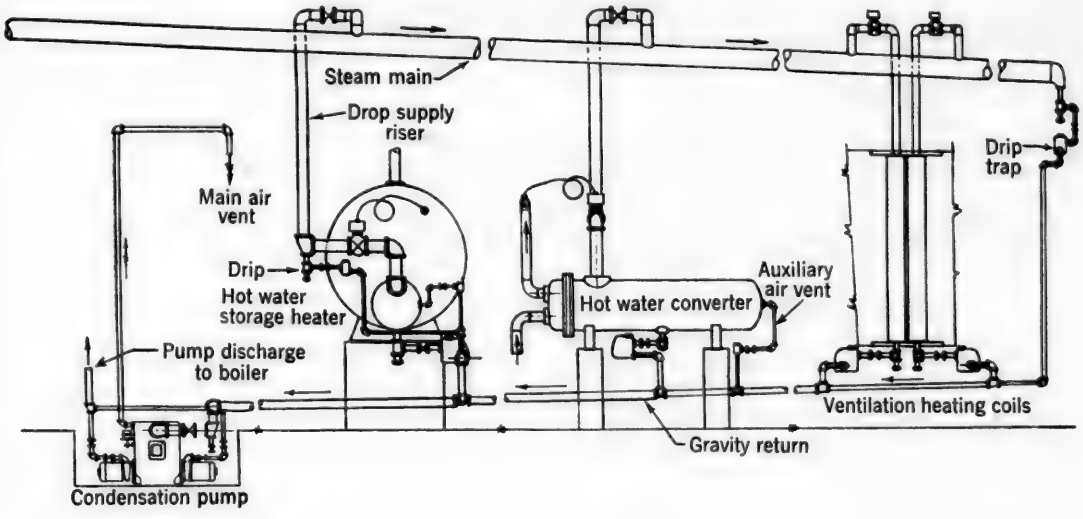
Example—What horsepower is required to drive a theoretically perfect fan if the diameter of the ring opening is 16 inches and it delivers 10,000 cfm of free air?

Solution—As shown by the broken line, connect 10,000 on the V-scale and 16 on the D-scale with a straight line. Read 5.0 hp on the P-scale.

For other than standard, free air conditions, apply fan laws to the answer.

HOOKUP FOR CONDENSATION PUMP

High Temperature Condensate—Dry Return



On an installation requiring the use of heavy and bulky heating equipment, there are special conditions to be met, among them:

1. The equipment, such as hot water storage heaters, hot water converters, and particularly ventilating coils with large fans and ducts, must usually be installed in a small area. Head room is often limited.

2. It is necessary to locate such equipment near to the floor as possible because of its bulk and weight, and because it is then more accessible.

While it is usually preferable to use a wet return, in some cases a dry return may be used advantageously as described.

For the piping arrangement illustrated, note the following:

The condensation pump is to be so located that all of the returns flow to the receiver by gravity. Return lines are to be properly pitched toward the pump inlet. All return lines must be brought to a common return header at the pump inlet. To provide the gravity flow required, it will generally be necessary to pit the pump.

Any drips from the steam supply main are to be provided with float and thermostatic drip traps.

The auxiliary air vent openings from the shell of the converter and from the return chest of the storage heater are connected to thermostatic traps. Use of these auxiliary vent lines aids in distributing the steam throughout the heating surfaces.

If a down feed riser is used on the hot water storage heater, it is important that thermostatic drip trap be installed at the base as shown. The trap is placed at the base of the down feed riser to drain the riser of condensate. Omission of the trap would permit slugs of condensate to enter the coil and a serious water hammer could result.

All air from the system vents from the pump receiver to atmosphere. This vent must open to atmosphere.

Piping hookups on this and the reverse page, through the cooperation of Nash Engineering Co., South Norwalk, Conn.

HOOKUP FOR CONDENSATION PUMP

Used As Mechanical Lift On Vacuum Heating System

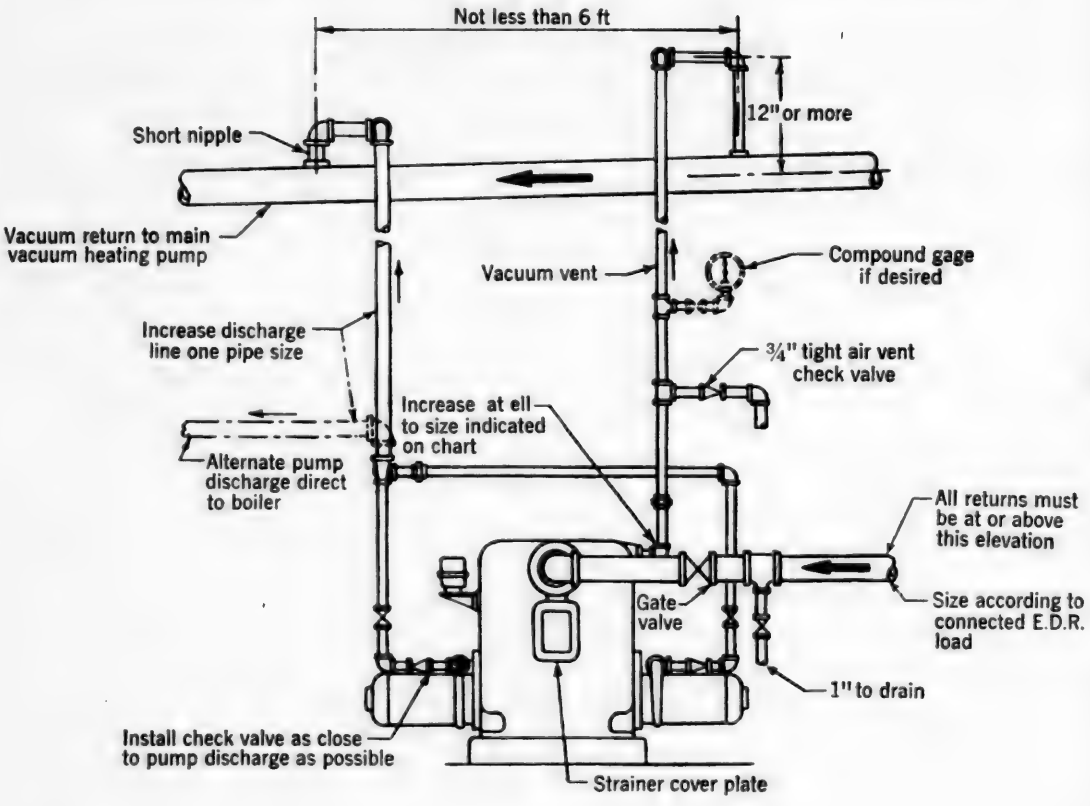

Not less than 6 ft
12" or more
Short nipple
Vacuum return to main vacuum heating pump
Vacuum vent
Compound gage if desired
Increase discharge line one pipe size
¾" tight air vent check valve
Increase at ell to size indicated on chart
Alternate pump discharge direct to boiler
All returns must be at or above this elevation
Gate valve
Size according to connected E.D.R. load
1" to drain
Install check valve as close to pump discharge as possible
Strainer cover plate

Illustration shows the use of a condensation pump as a mechanical lift in any type of vacuum heating system. It meets conditions encountered where the return lines from a section of the system are below the vacuum heating pump receiver inlet. The sole function of the condensation pump is to raise the condensate from the low section. This is done without in any way reducing the capacity of the vacuum heating pump. A duplex outfit is pictured; when a single outfit is supplied, one pumping unit is omitted.

The arrangement may also be used to advantage under conditions such as the following:

1. In a building having a large area and long runs of return lines, it is not always possible to provide sufficient grade in all these lines unless expensive trenches are used and the vacuum heating pump is installed in a pit. To overcome these physical restrictions, it is often preferable to install one or more condensation pumps as mechanical lifts to pick up condensate from low outlying sections of the returns. By so doing, it is then possible to grade the main return lines without expensive trenching and without pitting the main vacuum heating pump.

2. It may be used to handle hot returns from a split vacuum heating system. In this case, large volumes of condensate must be removed from such heating surfaces as hot water generators and blast coils. Usually the return line is short and at a low elevation. The auxiliary condensation pump must discharge directly to the boiler rather than to a vacuum return line. On some installations there is a possibility that flash steam may be occasionally vented from the condensation pump to the vacuum return line. If so, special measures are available to prevent this condition.

With the development of an industrial plant, large ground areas are made impervious to rain penetration and cause a heavy run-off. Ponding reservoir at lower right discharges into a road ditch.

Storm Drainage Problems in Industrial Plant Design

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Whenever adequate storm drainage is to be provided for a large industrial plant site, there are a number of influencing factors that must be considered. These are covered in this article so that a general overall picture of the design problems are presented to aid the engineer.

BEFORE work is started on the design of a storm drainage system for a large industrial plant, a survey is made of the area under consideration. A study of available test borings will help determine the character of the soil such as porosity to facilitate drainage. Reports of the area made by the Weather Bureau reveal how often heavy rainfalls may occur, intensities of rainfall, and the total precipitation in the vicinity of the new plant. An investigation is made as to the natural drainage and the quantity of run-off from the existing undeveloped site.

After the site is developed, the rate and quantity of the run-off will be considerably higher, due to large impervious areas created on the property. Often, in addition to draining the plant site, provision must be made for water run-off from adjacent areas. Occasionally, flow in an existing ditch on the property must be rerouted or intercepted.

Checking Existing Facilities

After a preliminary estimate of expected run-off is prepared, the following questions have to be answered as to whether the existing drainage facilities are adequate to receive a concentrated rate of storm water:

1. If the plant sewers are to terminate in an existing interceptor, was this interceptor designed for the additional load?
2. If the plant sewers are to discharge into a ditch, is the ditch adequate for the increased flow?
3. Is there danger of creating a flood condition downstream from the new plant, and should such a danger exist, is it feasible to improve the ditch—economically and otherwise, or should means be found to limit the rate of discharge from the plant sewers?
4. If the outfall sewer is to terminate in a ditch or a river, what are the high water elevations in times of extremely heavy rains?
5. If the plant system is to connect to an existing sewer, what hydraulic gradient is expected at the proposed connection?

Developing the Plot Plan

Simultaneously with these preliminary investigations, a plot plan of the project is developed to show location of buildings, roads, parking lots and railroad tracks. Careful consideration is given to possible future additions to buildings and services. The finished first floor elevation is established with consideration given to: The surrounding topography; suitable approaches from existing highways and roads; required minimum safe first floor elevation to prevent the plant from being flooded by water running off adjacent areas; locations and elevations of storm and sanitary services, if available; cost of filling or excavating portions of the property. These are some of the factors considered in determining the ground floor elevations of the main building and elevations of the service buildings on the property. Particular attention is paid to the floor elevation of the power house because of the importance and cost of the equipment housed in such a building.

Next, the roads, parking lots and railroad tracks are laid out and their grades established. The layout of these services determines the location and elevations of catch basins.

Contributing Sources

Basically, four contributing sources are considered in calculating the rate and quantity of run-off into storm sewers. These are: Building roofs; parking lots, roads, and paved areas; pervious areas of the yard, and finally special sources.

Building roofs because of their imperviousness are a source of concentrated run-off. The number of sumps on the roof is generally determined by applicable codes, and is based on the maximum roof area allowed to drain into any given size of the rainwater conductor. With few exceptions, these codes are based on the requirements to drain the roof at approximately the same rate as the water is collected. This "drain as it rains" system is advisable for sloped roof construction, where any substantial collection of water will concentrate at low spots of the roof with danger of spilling over the parapet.

Some building codes take cognizance of a different roof drainage condition created by a dead level roof design. When a roof is of level construction, the water falling on the roof is evenly spread over the entire area, and comparatively few roof sumps and small size conductors are provided. During a heavy rain, water temporarily ponds on the roof, as the rate of rainfall on the roof is higher than the capacity of the limited number of conductors provided.

There is considerable advantage in a dead level roof design. The capital investment can be considerably reduced by: The elimination of a great number of roof sumps; use of fewer and smaller sized roof conductors; a reduction in the size of the underground sewers, as the water collected on the roof will reach the sewer at a controlled rate; simplification of the structural design detailing and fabrication which permits duplication of some structural members throughout large building areas, and this, in turn, results in easier determination of clearances for mechanical and electrical services.

One of the disadvantages of the dead level roof construction appears during winter months when water alternately freezes and thaws on the roof surface. This may result in adding to the cost of maintaining the roof.

Parking lots and roads contribute heavily to a concentrated fast run-off to the plant sewer system. Here again, the sewer sizes can be reduced if temporary ponding of water on the parking lots during heavy rainfall is acceptable to the owner.

Rainwater falling on pervious areas of the plant is partly absorbed by the soil and vegetation; some of the water evaporates; some fills depressions in the soil, and the balance of the water flows to the nearest catch basin or ditch. This run-off is greatly influenced by the porosity of the soil, kind of vegetation and slope of the ground.

If large and flat pervious areas form a part of the plant site and are not to be used in normal present or future plant operation, then it may be advisable to depend on the ability of the soil to absorb the water rather than to intercept the run-off. If such unused areas happen to be in the low portion of the property then, if topography permits, some run-off may be directed to these areas for ponding, thus relieving the plant sewer system.

In addition to disposing of rainwater, storm sewers in industrial plants occasionally carry away uncontaminated water or treated waste, either continuously or intermittently. Loads of this nature should be analyzed as to whether they substantially contribute to the flow in the sewers, in which case they may influence the design of the system.

Locating Sewers

All water contributing points are spotted on the plot plan. They include roof water conductors, catch basins, pit drains and pump discharge outlets. The approximate location of the sewer outfall is determined, and several schemes with different sewer routes are prepared. Particular attention is paid to the: Actual length of sewers; advantageous location near large water contributing inlets; location of the sewer lines in such a manner as not to interfere with planned or even remotely possible future additions to the building or new buildings; limiting or elimination of hydraulically unfavorable conditions (such as unnecessary turns, large water quantities approaching a junction point from two opposite directions and bucking each other, and the trapping of water); possible interferences with other underground services, such as sanitary or process waste sewers, water lines and electrical ducts; interferences with existing structures; keeping to a minimum the number of railroad crossings required; locating sewers at proper distance from footings and foundations; avoiding, if possible, difficult excavations encountered in rock or shale.

After the preferred scheme has been selected, profile of the original and proposed finished grade along the route of the sewer is drawn.

Low points to be drained into the storm water system often determine the depth of the sewers. The cost of a deeper sewer installation must always be compared with the cost of a pump installation including operation and maintenance costs. Having determined the lower and/or most outlying point on the property to be drained by gravity and knowing the elevation of the hydraulic gradient at the outfall, the slope of the hydraulic gradient line can be established and indicated on the profile sheet. A check is made as to whether all catch basin inlets are located above the hydraulic grade line. If the danger exists that during extreme rainfalls some of the sewers could flood low pits, then backwater valves in these pits are provided or the pits may be pumped. After sizes of the sewers are determined, either by rational or a number of empirical methods, the sewers are drawn on profile sheets and checked for sufficient cover. Necessary adjustments in elevations are made in order to avoid interference with other underground services.

Impounding Basins

Frequently, new plants are located on sites with limited services provided for receiving a large concentrated storm run-off, or no such provisions. These limitations are reflected in a ditch, creek or intercepting sewer of inadequate size, and/or their high elevation in relation to the plant sewer system.

A requirement often imposed by governing authorities is that run-off from developed property must not exceed run-off from the original site. Limitations of this nature lead to installation of large storage capacity impounding basins on the plant property. During a heavy rainfall,

storm water from the plant sewer system discharges into the pond at a high rate raising the water level in the basin after which the pond is drained into existing facilities at a controlled rate either by gravity flow or by means of pumps.

Amount of Precipitation

The design of plant storm sewers is usually governed by the intensity of an assumed rainfall. Rainfall duration exceeding thirty to forty minutes is seldom considered. In the design of an impounding basin, primary consideration is given to the total precipitation expected over a period of days or weeks. If a pond is to be effective, it must have the reserve storage capacity for an assumed rain during a high rainfall season. Weather Bureau reports of the high and extreme rains over a 24-hour period are examined, and close attention is paid to precipitation which occurred during a number of days preceding and succeeding the critical day.

The total quantity of water reaching the pond is computed by multiplying the total precipitation, size of the area drained and the corresponding run-off coefficients. The coefficients are higher than the ones used in the rational formula for computing of storm sewer flow. This is due to the fact that the run-off coefficient tends to increase with the duration of rainfall. The increase in the value of the run-off coefficient is caused by filling of depressions in the ground and soaking of upper layers of the soil.

The desired storage reserve in a pond is established by computing the quantity of water reaching the pond and by determining the rate of drainage of the pond. The actual depth of the basin depends on the elevation of the incoming sewer, the extent of the area devoted to the pond and the slope of its banks. The latter is governed, primarily, by the characteristics of the soil.

Pond May Serve Many Uses

Frequently, a pond located on a plant site may serve other purposes in addition to reserve storage for storm water. For example, the pond lends itself to skimming of oil from the water surface. The oil is usually washed off from large hard surface parking lots and roads and reaches the pond by way of storm sewers. Occasionally a barrel of oil may be dumped unintentionally into a catch basin and find its way to the impounding basin. If the pond is dewatered into an open ditch, it is desirable, and often required, that the oil be separated from the discharged water. This can be accomplished by providing an oil separator on the outfall end of the pond whereby the oil from the surface is skimmed through a weir into an oil compartment while clear water is discharged into the outgoing sewer or ditch.

Some types of industrial plants require large quantities of mill water in their operation for use as process cooling water or as a means of collecting dust and waste sand in foundries and steel mills. An impounding basin on the plant site is uniquely adaptable for such an operation. The storm sewers discharge into the pond. The rain and mill water from the pond is pumped into the plant mill water distribution system and serves process machinery such as welders, ovens, condensers, and dust collectors. The mill water is then collected in the underground piping system which may be combined with the roof drainage system and is carried by gravity to the pond. Low velocity of flow in the basin results in most of the sand and other solids settling on the bottom of the pond. Installation of spray nozzles is necessary, occasionally, to obtain the required degree of cooling.

For mill water needs, a minimum water level must be maintained in the basin. Losses from evaporation or water soaked into the ground are made up by rain water. An adequate reserve storage volume in the pond must be provided above the minimum level for heavy rainfall occurrences. A two-compartment pond is frequently provided in order to permit the cleaning of one compartment without interruption to plant operation. If a certain level of water is constantly kept in the pond, then the retained water may be included in plans for fire protection water supply.

Pumping May Be Required

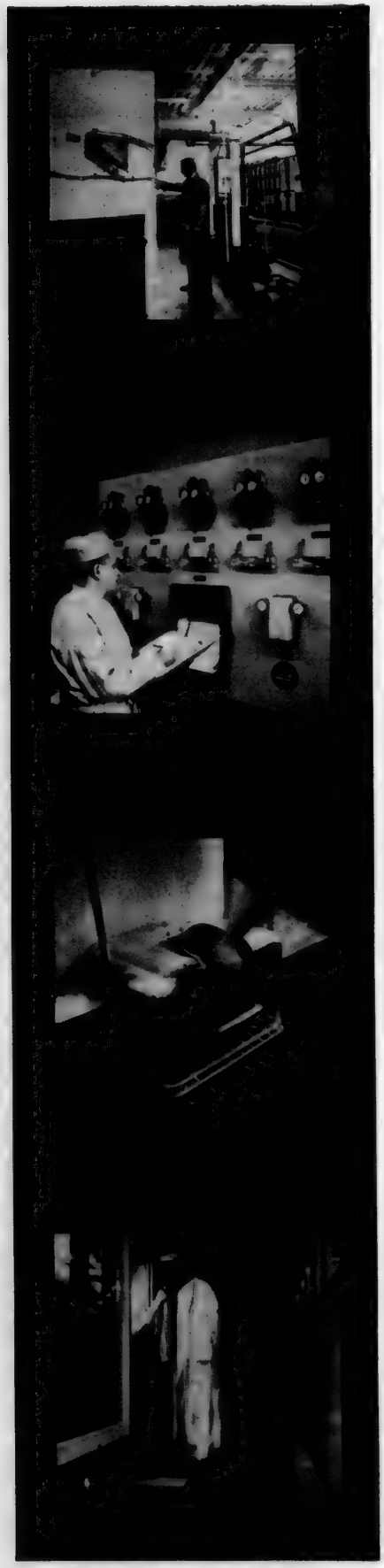
In planning to discharge plant sewers into an open channel, careful consideration must be given to normal and high water flow in the channel. A ditch or creek may be located sufficiently low in relation to the plant and have an adequate capacity for normal or even high run-off from the property. During a season of heavy rainfall, however, the run-off from areas upstream from the plant or backing up of the flow caused by some restrictions downstream may raise the water level in the ditch and result in a backup in the plant sewers. Often, if such a danger exists, and the sewers cannot be designed for adequate gravity flow during high water in the ditch, large capacity low head emergency pumps are employed. These pumps lift the storm water to the required elevation to cause a gravity flow into the ditch. The pumps are installed in "flow through manholes" which permit the use of the pumps only during high water in the ditch. When water level in the ditch is sufficiently low to permit gravity discharge of the sewers, the pumps are bypassed automatically.

With the sizable rates of run-off encountered in large industrial plants—often amounting to several hundred cubic feet per second—it may not be practical to install pumps of such large capacity; therefore, it may sometimes prove advisable to split the plant sewers into two separate systems. All roof conductors are connected to a pressure pipe sewer system which permits the discharge under the head of the roof during flood level periods in the ditch. The yard, parking lots and other low areas are drained through a gravity sewer system and discharge directly into the ditch during normal water flow in the ditch. When gravity discharge is not possible because of high water in the ditch, the storm water from the gravity system is automatically directed to a pump compartment in the "flow through manhole" and forced into the ditch. The splitting of the plant drainage into a pressure and gravity system permits installation of considerably smaller pumps and greatly reduces the danger of flooding of the plant site. It assures the discharge from roof into the ditch during any rainfall regardless of a possible break in power supply to the pumps.

As in any other engineering problem, storm drainage design is, to a great degree, a matter of judgment in providing adequately for immediate requirements and to meet possible future needs. The importance of the latter cannot be over-emphasized in view of the constant demand for expansion of existing facilities as well as for providing new ones.

EVEN THE WORKERS

Instruments used in jets, missiles, radar, and computers are wholly dependent upon small ball bearings, often no larger than the diameter of a lead pencil. A .000008-inch speck of dust can cause enough friction in such a bearing to throw a missile or aircraft off course. Extreme measures must thus be taken to prevent dust or other contamination from enter-



Top to bottom, Fig. 1,2,3,4.

Plant's huge air conditioning system (Fig. 1) is located on the roof. A sequence of Fiberglas filters, 3-stage electrostatic filters, and a bank of absolute filters catch particles down to 0.2 microns. Air is changed every 2.8 minutes. Temperature, humidity, and air pressure of each clean room are checked at monitoring center (Fig. 2). Temperature is 74 deg F, humidity 40%. Successively cleaner rooms are increasingly pressurized to provide out-rush of air when doors are opened, preventing entry of air-borne dust.

Technician (Fig. 3) enters area on serrated floor mat which scrapes gross dirt from shoes. Shoe cleaner brushes all surfaces of footwear. Sticky floor mats later pull all remaining dirt from soles. In locker room (Fig. 4) plastic bags isolate lint-free Orlon dresses and smocks from street clothes. Leaving locker room, worker steps on switch mat (Fig. 5) turning on overhead air shower. Sticky floor mat is seen through door.

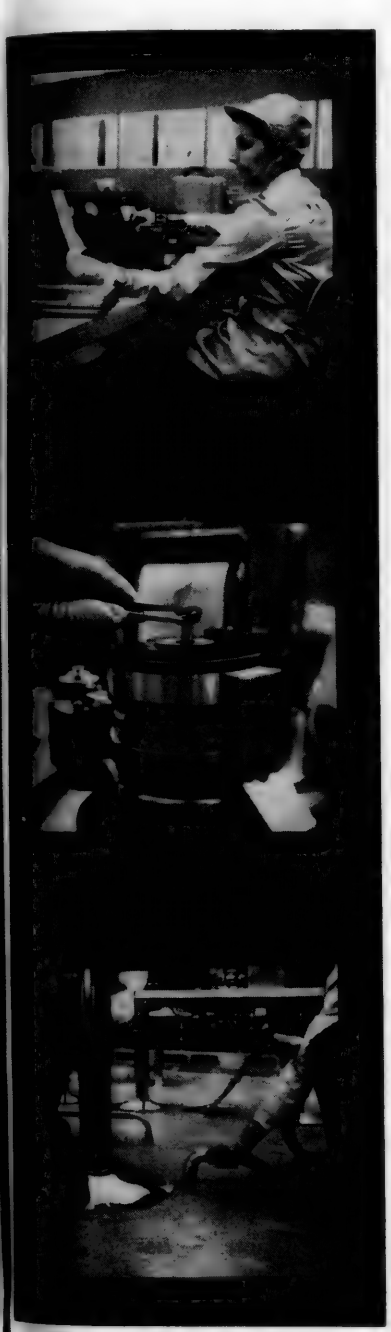
Passing through decontamination room (Fig. 6) hands are scrubbed to remove skin flakes, food residues, cigarette ashes. Filtered air blowers are used to dry hands, since towels produce lint. Workers don white kid gloves (Fig. 7) before entering area. Note translucent plastic ceilings, which provide shadowless illumination of at least 100 foot-candles at work level. All interior walls and doors are Herculite glass. Work tickets are enclosed in plastic bags. Only ball-point pens are permitted in area.

Seated at work table, inspector is ready to operate torque tester (Fig. 8). All tables, racks, outside walls are of glossy laminated plastic. In foreground are stainless steel containers in which bearings are moved from station to station. Tables are not

Top to bottom, Fig. 5,6,7.

ARE SCRUBBED!

ing these precision bearings during their manufacture and assembly. Experts from instrument plants across the country have traveled to New Britain, Conn., to inspect the many unusual precautions used by Fafnir Bearing Company to maintain the dust-free integrity of its facilities. Some of these measures are pictured.



Top to bottom, Fig. 8,9,10.

butted against each other or are they placed against walls, eliminating dust-catching crannies.

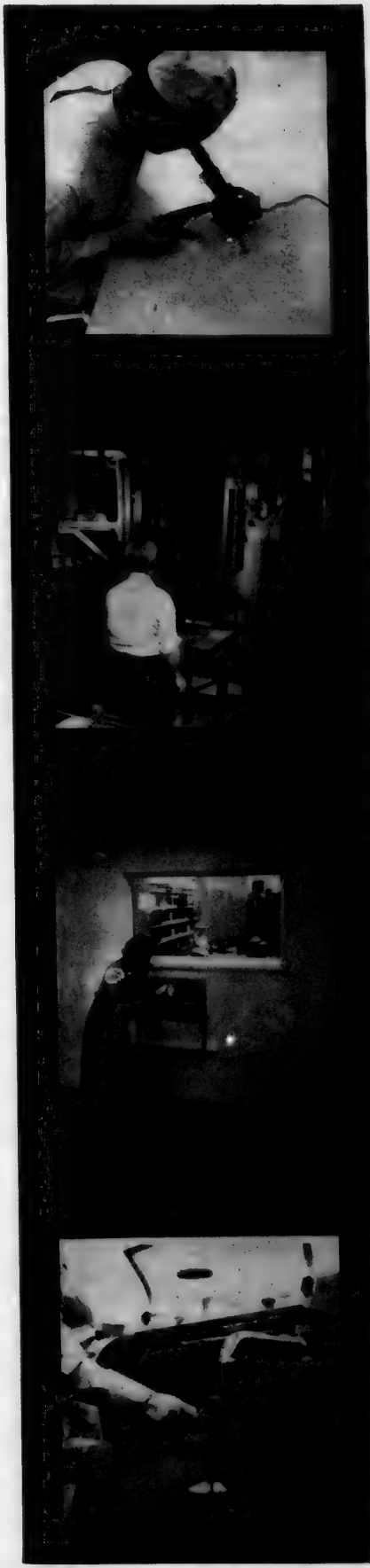
Special tools are used to handle bearings (Fig. 9). All electrical, air, and other utility lines are brought up through table pedestal and ducted beneath table top. Floors are constantly cleaned by attendant using plastic hose and built-in vacuum outlets (Fig. 10).

Dust control is a function of the amount of traffic moving through a department, so unnecessary worker and product traffic is kept to a minimum. "Squawk boxes" are used for inter-room communication. Products move through air locks. Dust counter is used (Fig. 11) to check effectiveness of air conditioner filters and traffic level.

All parts of the ball bearing are cleaned in an ultrasonic washing machine (Fig. 12). Inaudible sound waves at 20,000 cycles per second shake all particles loose during cleaning bath. Outside diameter of bearing had been checked to tolerance of 200 millionths of an inch. Surface finish of ball races are checked by Profilometer to levels as low as ½ millionths of an inch.

Carried in stainless steel pans, bearings enter dust-proof area (Fig. 13) through air lock for assembly, final cleaning, inspection, and testing. Parts are fitted together with radial play tolerance of 0.0002 inch. After assembly, bearings are demagnetized and processed through a series of cleaning operations. After tumble burnishing in rotating cylinders in rear (Fig. 14) bearings are rinsed and dried with filtered hot-air blast.

Fafnir calls its factory for instrument ball bearing manufacture the world's cleanest.



Top to bottom, Fig. 11,12,13,14.

Design for an Altitude Chamber

M. A. RAMSEY
Engineer, Worthington Corp., Ampere, N. J.

A test chamber was designed for testing electronics parts at simulated high altitude conditions while the chamber had a live load of 10 kw. Features of the design and the refrigeration system are described.

SPECIFIC tests for ground electronic equipment which required that operating tests be made at 10,000 ft simulated altitude and non-operating tests at 40,000 ft simulated altitude, dictated the design of a special altitude test chamber at the Griffiss Air Force Base, Rome Air Development Center.

The chamber at the New York base was not designed for unusually high altitude conditions, and the usable space within the chamber is not particularly large. But the specifications did require a rather heavy live heat load of 10 kw even at −90 deg F, and a pressure of 1.3 inches of mercury absolute (corresponding to an altitude of 70,000 ft.). Although the chamber was designed for operation at altitudes up to 70,000 feet, it actually has been operated up to 100,000 feet altitude, and this condition was for a usable space of 5 ft x 10 ft x 8 ft high. Specifically the design stated that, in addition to the heat entering through walls, and that due to any air leaking in, a live load of 10 kw should be present during the temperature pull-down, the pressure reduction, and during the steady state conditions which follow. There was no assurance that any of this would be radiant heat and, therefore, the equipment was selected on the assumption that all of this heat must be absorbed by the air circulated through the space.

Heat Load

A large refrigeration system, using methylene chloride as a brine, was to take care of other rooms as well. About 70,000 Btu per hr heat removed was used in the design of altitude chamber with brine entering at −105 deg and leaving at −97.5 deg. Heat leakage in through the walls and window, with −90 deg inside, and 70 deg outside, was estimated at 10,500 Btu per hr. This, added to the 10 kw, results in 44,600 Btu per hr which leaves 70,000 − 44,600 = 25,400 Btu per hr. It indicates that not over 10 BHP must be required by the blower which circulates the air over the cooling surface, and through the 5 ft x 10 ft x 8 ft useful space in the chamber.

The first thought was to use a temperature change for the air from −90 to −95 deg but, since the air density at −90 deg and 1.3 in. of mercury absolute is about 0.00465 lb per cu ft, this results in 210,000 cfm. Such a large circulation requires a rather large fan, and the total of static and dynamic losses would be limited to 0.24 in. even with a fan having 80% efficiency. The total space required for the chamber to permit this circulation with so low a resistance, would not be available, and the chamber cost would be excessive. It was, therefore, decided to cool the −90 deg air to −100 deg as this only reduces the log MTD between air and brine by one-third. This results in 105,000 cfm to be circulated and, with 75% fan efficiency, this can be circulated against a total resistance of 0.35 in. without exceeding 8.0 BHP. This allows a reasonable safety factor.

The space required by a centrifugal blower large enough to keep to the required efficiency for this capacity, made the use of that type blower impractical if the chamber size was to be kept within reason. A 6 ft diameter axial flow fan, operating at 1150 rpm, met the requirements. This fan was mounted with the shaft vertical and blowing straight down so as to distribute the air fairly even over the 5 ft x 10 ft room. This air then turned and passed through eight-row coils (each 8 ft high with 8.5 ft tube length) installed on opposite sides of the useful space, returning at reasonable velocity to the fan intake for recirculation.

This arrangement permits good access to the back of the coils, the brine headers on the coils, and to the fan with its shaft and universal joints. The final size of the chamber, with an allowance of 9 in. to 12 in. for insulation and the steel reinforcement, is 13.5 ft x 14 ft x 19.5 ft high.

Variable Speed Fan Used

A variable fan speed was necessary since power requirements at 1150 rpm with 70 deg air at 14.7 psia would be about 100 hp, and there would be no need of so much circulation as the air density increased. Consideration was given to the use of a variable speed motor in the chamber with the fan wheel mounted directly on the motor shaft. The extra 4,000 Btu per hr (approximately) which would be given out by the motor would still have been within the load limits which had been allowed. However, the specifications required any motor inside the chamber to be explosion proof so that such a solution was ruled out. The actual drive is a variable speed belt driven unit between the motor and the fan shaft. This permitted use of a standard ball bearing (the motor has its shaft vertical) 1800 rpm squirrel cage motor. Although 10 hp was sufficient, a 15 hp motor was supplied to permit a little less care in changing the speed as the air density in the chamber increased during the simulation of decreasing altitude.

A push button operated small auxiliary motor permits variation of the drive ratio from an accessible point, and a limit is fixed at 1150 rpm fan speed since that is the maximum recommended by the manufacturer for the particular fan used.

The maximum load in the fan shaft will be 15 hp, at as low as about 450 rpm, but the fairly long overhang of the shaft into the chamber made a fairly large diameter advisable, and about a 3¼ in. shaft was used. By making it of stainless steel tubing, its cross section for heat transmission was reduced and a further gain in that direction resulted from the low conductivity of stainless steel that was used.

Shaft

The connection between the drive shaft from outside to the fan shaft is made through an intermediate shaft about 2 ft long. It seemed reasonable to expect ⅛ to ¼ in. misalignment between the drive and fan shafts due to temperature and pressure changes. Flexible coupling manufacturers did not wish to recommend their couplings under these conditions. Therefore, universal joints similar to those for automobiles were used with the usual spline connection at one end to allow for variations in length. These universal joints were lubricated with a silicone grease recommended for these temperatures, and have given satisfactory results.

Cabinet Door

The door gives a clear opening 4½ ft x 8½ ft before insulation. This permits a final clear opening of 4 ft x 8 ft so that everything in the chamber, including coils, fan and fan inlet bell, can be removed if it is ever desirable. This door weighs more than two tons. To permit reasonably free movement, it is hung from a davit which is supported by tapered roller bearings. A screw connection to the davit permits close adjustment of the door height. The hinges at the side of the door are merely guides and do not support any of the weight of the door.

Insulation consists of a number of aluminum sheets with air spaces between. During evacuation of the chamber, there is sufficient leakage between the sheets to permit the air to leave at a reasonable rate. However, the steel beams supporting the outside shell require a 10 in. space on the sides and 12 in. on the top and bottom, and air in this space could not be expected to pass through the insulation with sufficient rapidity. Therefore a 9 in. x 9 in. duct joins all of the spaces between beams and this duct connects to the main line.

The 8 in. connection from the interior of the chamber will sometimes be removing air at −90 deg. Although the pipe can be insulated, it must have a leak tight connection to the chamber.

Window in Door

The door has a 24 in. x 18 in. window. This window is sealed against the entrance of air, supports the atmospheric pressure, and provides a barrier to heat flow. The use of multiple layers of glass with very low dewpoint between them was suggested, but this did not seem a practical solution for the varying air pressure.

The window uses a single piece of 1 in. thick tempered glass mounted on the outside of the steel door. This glass only serves to keep out air. It will always be very near the temperature of the ambient surrounding the chamber. Inside of the steel window frame is a plastic form with plastic spacers, permitting the mounting of as many as ten ¼ in. sheets of plate glass. These are all vented to the inside of the chamber so that the dewpoint next to a glass surface will always be less than the temperature of the glass. These ¼ in. sheets of glass only serve to create separate dead air spaces.

Extra plastic spacer frames were provided so that 6 or 8 glasses might be used instead of ten, by substituting an extra ½ in. spacer for two glasses. Since the steel and insulation result in about a 19 in. thickness, the field of vision would be somewhat limited if all glasses were 24 in. x 18 in. To improve this, the inner glasses were made about 30 in. x 24 in. This resulted in little extra cost because these panes were only of standard plate glass.

Ordinarily there will not be an excessively thick accumulation of frost on the coils since any ventilation air is considerably dehumidified before entering, and the coil surface is over 8,000 sq ft. Electric heaters are provided and defrosting can be accomplished by having the blower in operation when the heaters are turned on, and the brine circulation stopped. Water which drains from the coils will then enter the drain piping which joins the several points where floor drains are provided. These drains run to a single outlet with a valve which can be closed when the chamber is in operation. Any small amount of water left in this piping will cause no freezing problem because the piping, except very short vertical pieces, is outside of the insulation where the temperature will never be very near freezing.

All the interior finish of the chamber is aluminum, stainless steel or brass, giving a good appearance and freedom from corrosion. Slip joints in the aluminum sheet on the sides and ceiling of the chamber assure freedom from expansion and contraction difficulties.

Evacuation from 30 in. to 1.3 in. Hg pressure (corresponding to 70,000 ft altitude) was specified to be possible in 30 minutes, and experience shows this change to be possible in just under 25 minutes.

This chamber has been in actual use for some time during which it has been possible to demonstrate that the features of the design described have resulted in the desired standard of performance.

In addition to the altitude chamber, the test facilities included tropic rooms, arctic rooms and combination of tropic and arctic rooms. The tropic rooms operate from 40 to 190 deg and one has facilities for simulating rain. The arctic rooms operate at any point between ambient and −90 deg. The combination tropic and arctic room must maintain any predetermined temperature from 190 to −70 deg. It has no rain simulation facilities.

Refrigeration System

Refrigeration for the rooms having the higher temperatures is provided by two multi-cylinder F-12 compressors using direct expansion air coils in the rooms. Suction valve unloaders give capacity control. Refrigeration for the low temperature conditions is provided by a methylene chloride brine circulating system, with −105 deg brine leaving the brine cooler. The brine is cooled by F-22 with a 100 hp 2-stage centrifugal unit serving as the first step of compression, a 450 hp, 4-stage centrifugal unit serving as the second step and four 75 hp reciprocating 4-cylinder machines in parallel serving as the third step of compression. This takes the F-22 gas from liquid boiling at about —120 deg to a pressure corresponding to a 100 deg condensing temperature.

Test facilities were planned for testing material which may be transported by cargo plane. Much valuable equipment including electronic apparatus, must be transported to the various field forces and must be carried at high altitudes. If the low pressures and various temperatures or the rapid change of these conditions, damage the equipment so that it is useless when it arrives, the waste and the lack of the necessary equipment for the fighting unit would be serious.

LOUIS BLENDERMANN ON

PIPING AND PLUMBING

Fire Protection in Tall Buildings

SOME specific fire protection means is required in every new building being erected. This may consist of sprinklers, fire standpipe or other systems required by the insurance underwriters, local fire department or even the building owners. Of all available systems, the fire standpipe is most generally employed.

To cover design details, this article will consider the installation of a fire standpipe system in a 25-story office building. This size building is used for an example because (1) it represents a tall building and (2) because it is the tallest building allowed in many of our cities.

Fire Standpipe Systems

The particular arrangement of piping and equipment that may be utilized in a building of this size is best illustrated by Fig. 1. Two standpipe risers are used in the structure illustrated. The number of standpipe risers is determined by the total area of each floor serviced by the hose stations. Since only 75 ft of hose are generally allowed at each hose station, sufficient risers must be considered to fulfill the dimensional requirements. Some areas of course, allow 100 and 125 ft of hose which is quite helpful in a good number of cases. The standpipe risers and hose stations are usually contained in the stairways of the building.

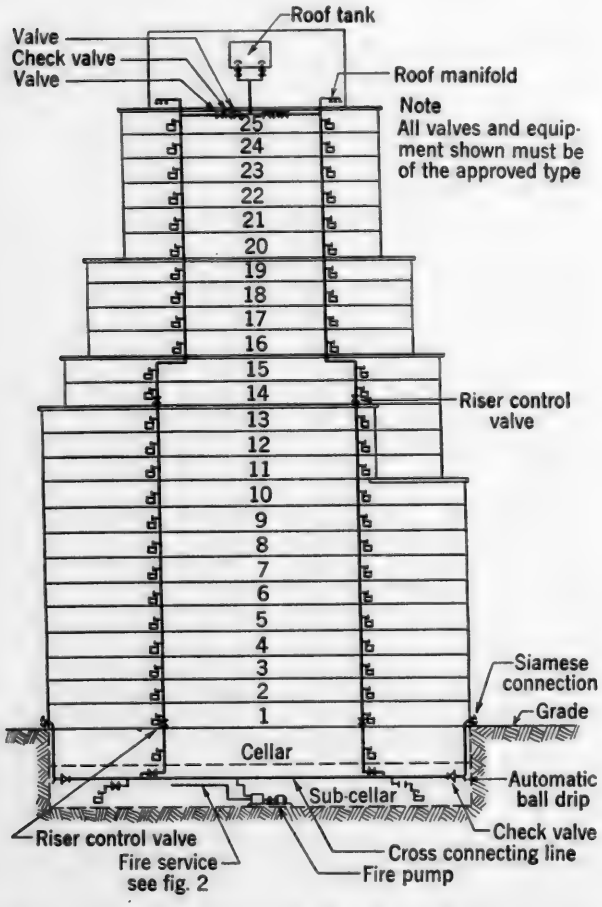


Fig. 1. Typical arrangement of a fire standpipe system in a 25-story office building.

A brief explanation of how the system functions is as follows: Water is supplied to the roof tank by the house pumps which have not been shown. The roof tank holds water for both the domestic and fire reserve and the minimum fire reserve for this installation is 5000 gal. The tank is set at an elevation above the roof that will supply domestic water at a prescribed pressure to the toilet fixtures on the 25th floor. The required pressure at this point ranges from 15 to 25 psi, depending upon the particular type of water closet contemplated.

In Fig. 1, the supply from the roof tank is shown as being connected to both standpipe risers. Often this line may be connected to only one of the risers and it will supply the other riser in an upfeed manner by means of the cross connecting line in the sub-cellar. The fire reserve furnishes the standpipe system with the water it needs for fire protection. On the lower floors where the pressure will exceed 80 psi at the hose station, pressure reducing devices are employed to maintain prescribed pressures. The type of device used here for example is the orifice type, which fits into the hose connection at the $1\frac{1}{2}$ in. valve.

The base of the standpipe risers are connected to a cross connecting line which terminates at the two siamese connections shown. In this building a fire pump is also required and this unit is placed in the sub-cellar in a room that adjoins one of the stairways. Two fire service mains are installed to supply this pump with the water needed to combat a serious fire.

Component parts of the fire standpipe system are now covered, starting with the piping and equipment located in the sub-cellar.

Sub-cellar Floor Level

Figure 2 shows a typical arrangement of the piping and equipment as may be found at this floor level in the building.

The 6 in. fire mains equipped with valves and curb boxes enter the building from both streets and pass through the valved and meter arrangement before it connects with the fire pump. The fire pump must be of the approved type, capable of maintaining the pressure

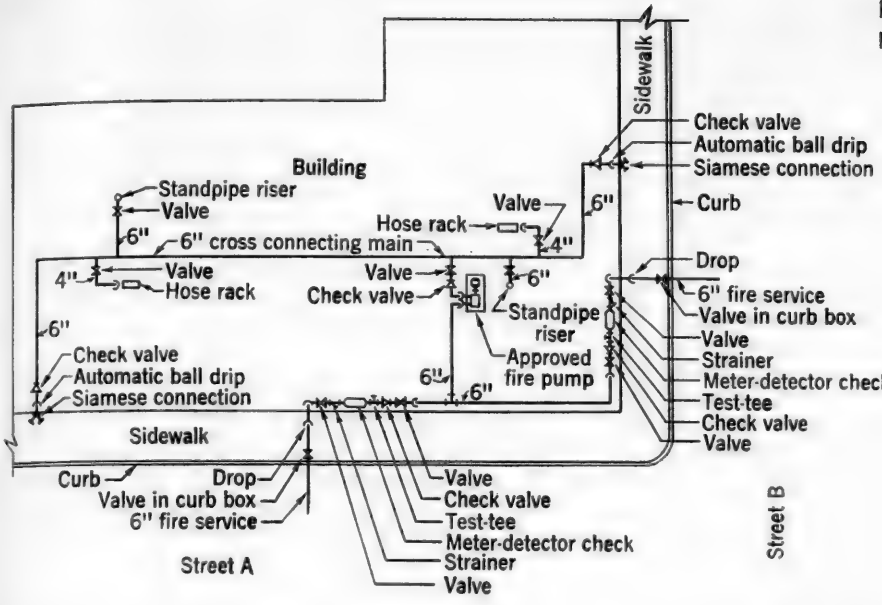


Fig. 2. Arrangement of fire standpipe piping in sub-cellar of building discussed.

required in the fire standpipe system. The size of this pump is easily calculated but it is always good practice to consult with the pump manufacturers representative to ascertain the performance characteristics of the pump selected. It is also well to check with the local authorities for any requirements they may have regarding the fire pump.

As previously mentioned, the fire pump room should be located adjacent to one of the stairways, since this room must be easily accessible to firemen entering from the street. Several signs indicating the way to the fire pump room should also be placed both inside the building and out, to point the way to this room. It is always advisable to check both the location and requirements of this room with the local fire authorities.

A cross connection line with a siamese connection on two different streets is required. A check valve and automatic ball drip is placed on this line inside the building. A drop has been shown on the fire service line before it enters the building. The fire service line is installed near the surface of the grade. The drop is required to allow the line to be low enough for entering the sub-cellar.

Siamese Connection

There are several types of siamese connections available for installation on the outside face of the building. The type shown in Fig. 3, is for example only, and is a flush type siamese connection equipped with the number of hose connections required by the fire department or local authorities. It is very important to check with the local fire department for the specific type of hose threads

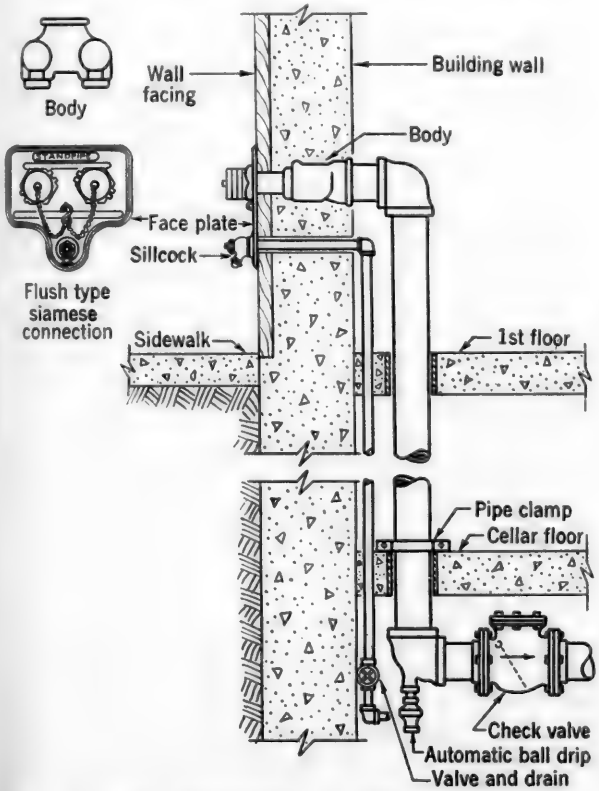


Fig. 3. Typical arrangement of siamese connection and component piping.

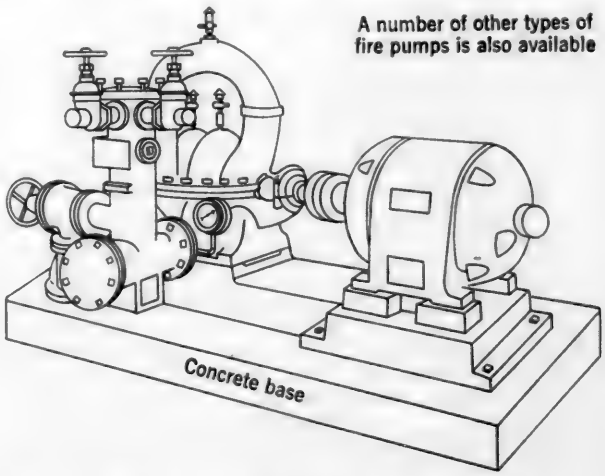


Fig. 4. Type of pump installed for fire service in a building.

that should be specified. In fact, this consideration applies to all threaded equipment in the building. Unless the hose threads conform to local fire department standards, it will be impossible for the fire department to connect their equipment in the event of a serious fire.

A check valve and an automatic ball drip must be placed on the cross connection line as shown. The check valve prevents interior water pressures from reaching the siamese connection while the automatic ball drip drains the line between the check valve and the siamese connection of any water that may accumulate.

Sillcocks, other than the type shown, may be utilized. Of these, the non-freeze type is very popular, especially in temperate climates.

Fire Pump

A detail of the fire pump is illustrated in Fig. 4. Here the fire pump is set on an adequate concrete base. The supply and discharge connections to the pump are equipped with flexible connections to prevent piping vibration and clatter when the pump operates. Since the pump is tested periodically, these are worthy provisions. All the other control devices normally installed with the pump have been omitted for the sake of clarity.

Base of Riser Supports

It is highly recommended that adequate supports be placed at the base of the standpipe risers. Even though the risers themselves are held firmly in place with pipe clamps at intervals of every two or three floors, a support at the base prevents any possibility of the heavy riser slipping.

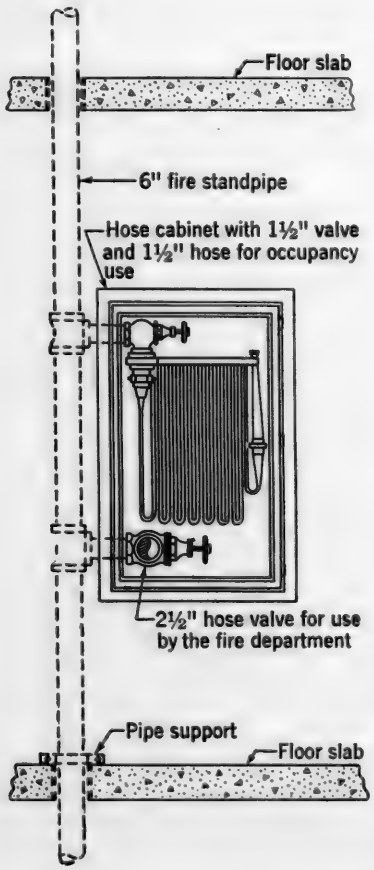

Floor slab
6" fire standpipe
Hose cabinet with 1½" valve and 1½" hose for occupancy use
2½" hose valve for use by the fire department
Pipe support
Floor slab

Fig. 5. Detail of a fire hose station.

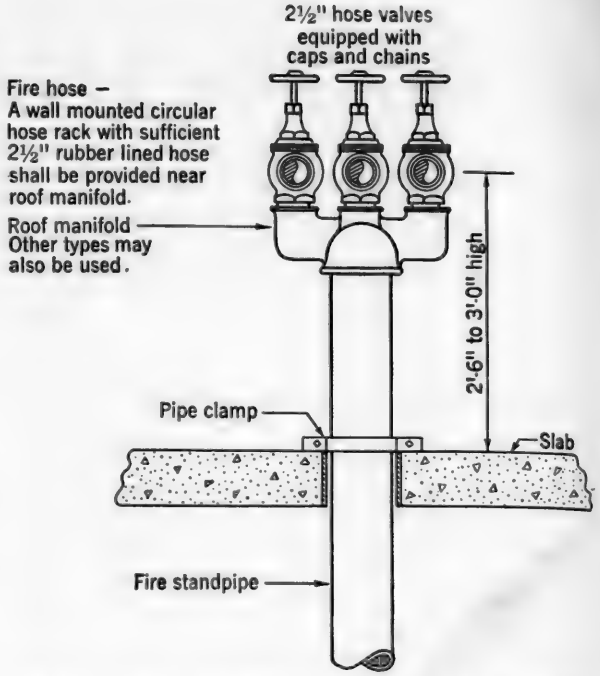

2½" hose valves equipped with caps and chains
Fire hose – A wall mounted circular hose rack with sufficient 2½" rubber lined hose shall be provided near roof manifold.
Roof manifold Other types may also be used.
2'-6" to 3'-0" high
Pipe clamp
Slab
Fire standpipe

Fig. 6. Detail of roof manifold installed in a heated stair tower.

The supports usually consist of a special elbow resting on a brick or masonry pier. If there is not sufficient space for a pier, then an adequate hanger support should be given some attention.

Hose Stations

In this case the hose station is a fire hose cabinet as shown in Fig. 5. The hose cabinet houses a 1½ in. valve and 75 ft of unlined linen hose. It is common practice to utilize 1½ in. hose because hose of this diameter is more easily handled by the occupants of the building than 2½ in. hose, which is the size used by the fire department. A 2½ in. hose valve is placed in the lower portion of the hose cabinet for fire department use. The fire department will attach their own regulation 2½ in. hose to this valve.

Where, because of the height of the riser, the water pressure will exceed prescribed limits, pressure reducing devices can be employed. When these devices are used, they are placed only on the 1½ in. hose rack. Several manufactured devices are available for this purpose. The local fire department should again be consulted for any requirements they may have for the hose cabinet and the equipment it should contain.

The standpipe riser is generally supported at every second or third floor by means of the pipe clamp shown.

Roof Manifold

A roof manifold is required at the roof of the building to combat fires that develop at this level or just for wetting down this ear in the event of fires at adjoining structures. A typical roof manifold is detailed in Fig. 6.

This unit illustrated consists of a patented manifold with three capped hose outlets. The hose used at this area is rubber lined to withstand dampness or the elements that tend to affect it.

If the space where the roof manifold is to be located is

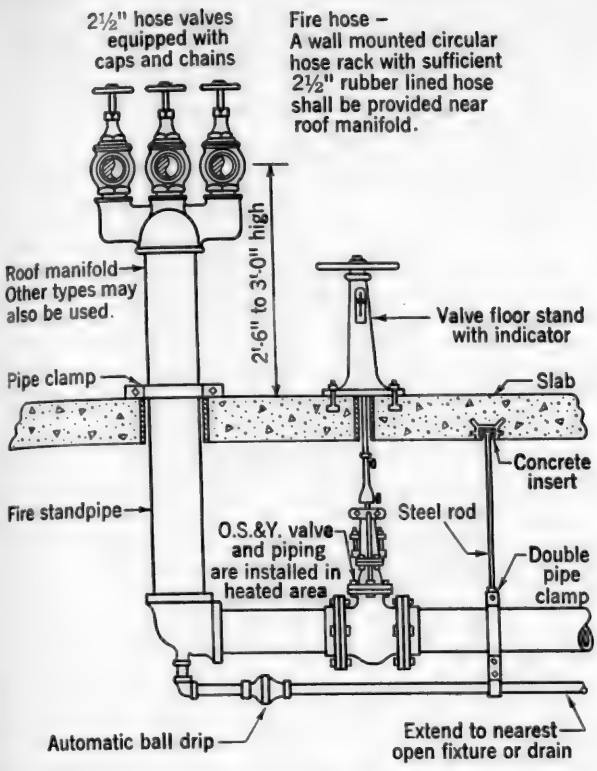

2½" hose valves equipped with caps and chains
Fire hose – A wall mounted circular hose rack with sufficient 2½" rubber lined hose shall be provided near roof manifold.
Roof manifold Other types may also be used.
2'-6" to 3'-0" high
Valve floor stand with indicator
Pipe clamp
Slab
Concrete insert
Fire standpipe
Steel rod
O.S.&Y. valve and piping are installed in heated area
Double pipe clamp
Automatic ball drip
Extend to nearest open fixture or drain

Fig. 7. Detail of roof manifold installed in an unheated stair tower.

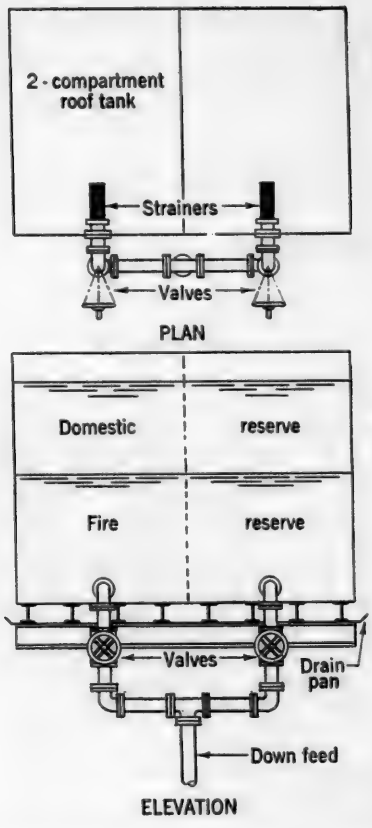


Fig. 8. Arrangement of piping connection to roof tank.

not a heated area, then a special arrangement must be utilized as given in Fig. 7.

Here the manifold and hose is located in the unheated space while the O.S.&Y. (outside stem and yoke), valve controlling the water supply is placed in or at the ceiling below. The valve handle is extended through the roof in the manner shown. An automobile ball drip removes any water that remains in the line between the O.S.&Y. valve and the manifold after the unit has been used or tested. This device prevents the possibility of water freezing in the manifold. It is positive assurance against damage in the event that the O.S.&Y. valve leaks or is accidentally left open. Roof manifolds have an additional use in many new government buildings, in that, they are used to wash down roofs should a heavy atomic fallout occur.

Roof Tank

The roof tank is installed either indoors or out. When it is installed indoors there is no danger of the water in the tank freezing. However, when it is installed outdoors, the tank should be equipped with heaters which may consist of steam coils or electric heating elements. Office buildings are subject to long week-ends when the building is unoccupied. It is at these times that freezing will occur. Figure 8 shows the general arrangement of the piping at the roof tank.

The roof tank illustrated is constructed in two sections or compartments. This type of construction permits the cleaning of one compartment while the other still furnishes a safe reserve of water for fire protection purposes.

The connections for the fire lines is taken at the bottom of the tank with enough clearance from the bottom of the tank to avoid the sediment that accumulates here. Strainers are placed on these lines in the tank to prevent any foreign objects from entering the lines. A drainage pan is installed under the tank to catch and drain any condensation that will form and run down the sides of the tank.

Only the fire standpipe lines have been shown in Fig. 8; all other piping, including the tank controls, have not been illustrated. Although roof tanks may also be constructed of wood, the tank shown in Fig. 8, is of steel construction.

Large Fans Serve Newspaper Building

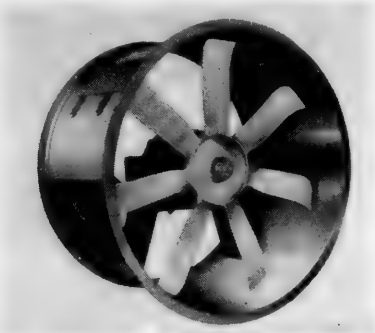
Two 80¾ in. double width centrifugal airfoil fans, made by Chicago Blower Corp., were installed in the Register and Tribune Building in Des Moines, Ia., to handle 375,000 cfm for air conditioning. The backward curve, non-overloading models form the heart of a centrally located 1000-ton air conditioning system. It is believed that this is the first large newspaper building to be successfully air conditioned from a single air handling unit. Fans, illustrated on the cover of this issue, have been in operation for about a year, and are housed in a sheet metal penthouse on top of the newspaper building. They meet the air volume requirements of the plant. William E. Nanes, Des Moines, served as consulting engineer on this project.

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on the last page for securing further information on new equipment and materials described in this department.

Propeller-Type Industrial Fans

For efficient performance against static pressures normally considered above the range of propeller-type fans, SP-7 Semi-Pressure fans are offered by Aerovent Fan Co., Inc., Piqua, Ohio.



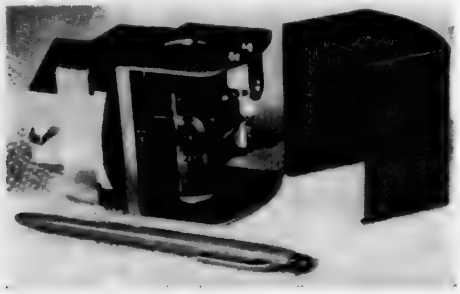
Especially effective in the medium pressure range up to 4 inches static pressure, these units move more air at slow speeds, with essentially lower horsepower requirements. Motors are adequately rated for dependable operation throughout the entire static pressure range without overload. Maximum air-moving efficiency is obtained with newly-developed, broader Macheta airfoil propellers, with 7 blades.

Available in direct-connected, direct-driven duct, belt-driven duct, Bi-Flo duct and extended-shaft types, they are offered in a wide range of sizes, from 14 to 60-inch dia.

More information? Circle Item 1, postcard, last page.

Photocell for Oil Burners

An externally-mounted miniaturized photocell for small commercial oil burners, has been introduced by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. It was developed for installations where the face plate temperature will not exceed 200 deg F.



A removable slide glass window allows easy maintenance and eliminates the necessity of shutting down the burner in order to clean the photocell as would be necessary with blast-tube mounted photocells. The external mounting also prolongs photocell life-expectancy.

Over-all length of the photocell, designated C7010A, is 3⅞ inches. It is 2¾ by 3 inches in height and width. The photocell is tapped for mounting on 1¼-inch pipe.

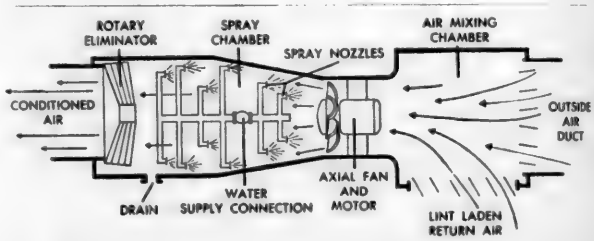
The miniature size and small pipe permit easy installation either adjacent to the blast tube or at some other convenient location. A ⅛-inch pipe tapping provides a ready means for pressure ventilation of the cell for cooling to minimize deposits on the window.

The new unit when used with the electronic Protectorelay makes an ideal control combination for pressure atomizing burners above 7 gph to comply with new UL requirements. The control combination has the UL *interchangeable* classification. This permits field installation on new or existing burners.

More information? Circle Item 2, postcard, last page.

Spray-Type Air Conditioner

Development of a new system for air conditioning large industrial areas is announced by Carrier Corporation, Syracuse, N. Y. Key feature of the system is a completely new spray-type air conditioning unit. Called the Rotaspray Weathermaker, the new device is designed for overhead installation occupying waste space. It will handle a much greater volume of air for its size at higher velocities than is possible with any other equipment currently available.



The device incorporates spin-dry principle to remove water droplets, lint and other foreign matter — an especially important factor in textile applications. Revolving at the end of the spray chamber, as illustrated, is the eliminator wheel. Due to its rotating action it forms a wall impervious to the passage of unvaporized water droplets and foreign particles, yet freely passes the conditioned air at velocities up to 2400 fpm.

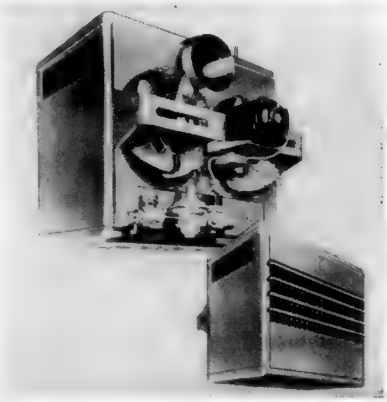
The air conditioner is produced in four sizes with capacities in the range from 10,000 to 30,000 cfm of conditioned air. Overall dimensions range from three to six feet in diameter and from 16 to 23 feet in length.

Control of the new system is as simple as setting a home thermostat. In approximately the middle of each processing area served by a unit are two instruments which are simply set for the room temperature and humidity desired. Other advantages are that it requires only one-third the space of present-day equipment, provides more accurate control of humidity and virtually eliminates system cleaning and maintenance.

More information? Circle Item 3, postcard, last page.

Larger Unit Heaters

Its largest suspended gas unit heaters, offered as standard equipment, are Models US300-F and US300-B produced by Reznor Mfg. Co., Mercer, Pa. They are propeller fan and centrifugal blower powered, respectively.



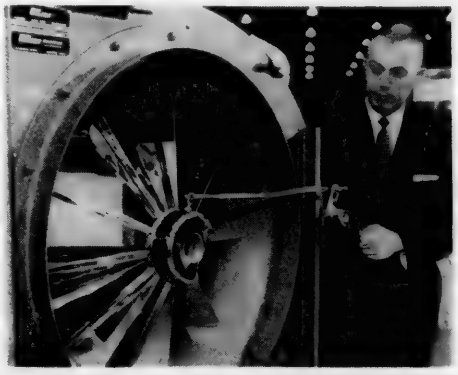
Minimum noise level is achieved by use of two smaller, 15-inch fans or blowers. On the first model, a ⅓-hp motor drives them both. On the latter model, each has its own motor. Overall dimensions, in inches, of the former model are 33½ high, 36 wide, and 40¼ deep; on the latter, 39¼ deep.

More information? Circle Item 4, postcard, last page.

Vane Damper for Centrifugal Fans

A variable inlet vane damper for controlling the air volume and pressure of airfoil centrifugal fans is announced by Chicago Blower Corp., Franklin Park, Ill.

Conveniently designed to fit into the fan housing, the damper provides maximum economy of operation by acting as a manual or automatic output control, the manufacturer points out. By means of the damper, power consumption can be greatly reduced and operating costs cut to a minimum.



The damper features nine pie-shaped metal vanes, mounted in an aerodynamic inlet cone and adjustable at angles from 0 deg when fully closed to 90 deg when entirely open. When set at the desired pitch, the metal vanes spin the entering air in the direction of the fan blade's rotation.

Available in sizes to fit fans from 12 through 80¾ inches dia, vane dampers are designed to be furnished as an integral part of the fan when it is ordered. However, they can be easily mounted in fans in service by removing the original inlet cone and substituting a new inlet cone with the self-contained vane. The damper does not extend outside the fan housing.

More information? Circle Item 5, postcard, last page.

Pressure Relief Valve Line

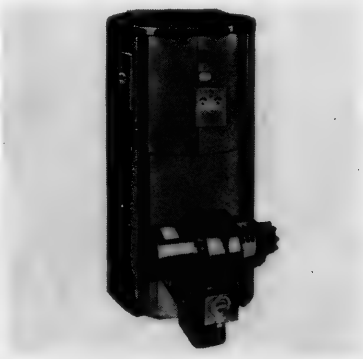
Watts Regulator Company, Lawrence, Mass., has made available a new series of ASME rated pressure relief valves for hot water heating boilers. These valves are known as the 740 Series. They feature large internal flow areas and increased outlets to afford individual relief valves having exceptionally high Btu per hr steam discharge capacity ratings. The series has female inlet and outlet connections and is available in sizes 1 x 1¼ inches, 1½ x 2 inches, and 2 x 2½ inches.

The series combined with the company's redesigned and re-rated 174A Series and No.74A comprise a complete range of sizes and ratings making it possible to meet the smallest or largest requirements for pressure protection of hot water heating and supply boilers.

More information? Circle Item 6, postcard, last page.

Vertical Oil-Fired Boilers

A new line of vertical boiler-burner units, oil fired, has been announced by Federal Boiler Co., Midland Park, N. J. The new line, FVW Series, is available in three styles—Flush Jacket, Extended Jacket, and Packaged (FPK). The Flush and Extended Jacket styles feature a new jacket design which permits jacket installation after all piping has been completed. It is said to be particularly advantageous in installations where space is at a premium.



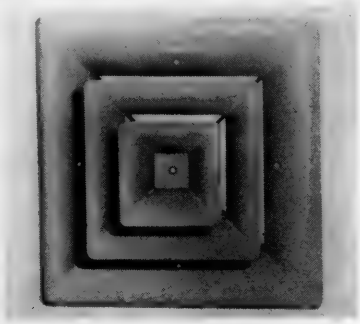
Matching burner if desired is shipped completely assembled and requires only insertion into boiler. Burner is available in flange or pedestal mounting styles.

200 gph tankless coils are provided as standard equipment for domestic hot water supply. Larger size coils are available as optional equipment. The series is available in five sizes with net output of 74,000 to 149,000 Btu per hr.

More information? Circle Item 7, postcard, last page.

Square Ceiling Diffuser

A square ceiling diffuser with distinctive, modern lines has been added to the line of diffusers manufactured by Air Control Products, Inc., Coopersville, Mich. Desig-



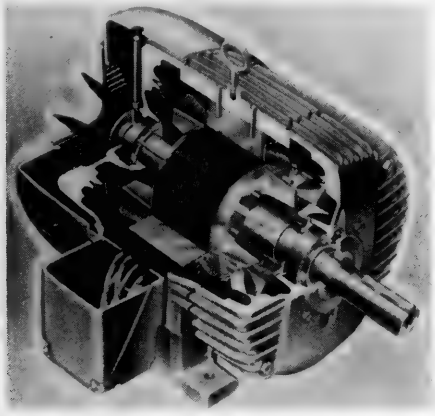
nated Model 90, the new diffuser is of the step-down type, available in 6, 8, 10, 12, 14, and 18-inch squares. Striking in appearance it lends itself to modern decor, and is attractive for use with square acoustical tiles.

A push-pull rod-operated damper has been designed for use with the square diffuser. Installation frames, No. 92, are also available for installations not using damper. The unit is fully gasketed and complete with screws for mounting.

More information? Circle Item 8, postcard, last page.

New Induction Motor Line

Completion of its switch-over to lighter, more compact rating of its line of induction motors is announced by General Electric Co., Schenectady, N. Y., upon introduction of its Tri-Clad 55 open dripproof and totally-enclosed fan-cooled line in capacities from 40 to 125 hp. Re-ratings from 1 to 30 hp were announced earlier.



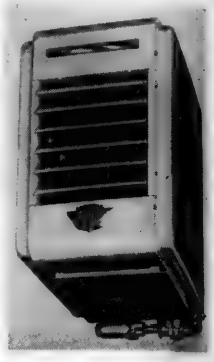
Motor line is built to new standards suggested by the National Electrical Manufacturers' Assn. which assign a greater horsepower to a given motor frame size. Its new motors average 20% lighter than the former models —with actual weight savings varying between 100 and 500 lb per motor, and size, for comparable horsepower ratings, has been reduced an average of 27%, the company states. These weight and space savings were achieved largely as a result of insulation improvements which permit the use of thinner and more effective materials.

In addition to higher efficiency per pound of motor weight, the line has been designed for quieter operation and reduced maintenance. An improved lubrication system better protects the bearing housing from the entry of dirt, yet allows regreasing when necessary.

More information? Circle Item 9, postcard, last page.

Gas-Fired Unit Heater

Utility Appliance Corp., Los Angeles, Calif., announces the addition of a compact 25,000 Btu per hr unit heater, Model No. 25 UF. Designed to to provide complete versatility on unit heating jobs, the model is a space-saver that provides maximum headroom in restricted areas, and is encased in a modern-design cabinet that is die-formed in grey hammer-tone enamel to blend with all interiors.



Utility engineered heat exchangers and porcelain-enameled elements are featured for maximum heating capacity and long life, and adjustable discharge louvers assure complete control of warm air flow. Fans are dynamically balanced, and powered by a slow resilient-mounted motor for maximum air delivery with a minimum of noise.

Fully automatic fan and limit controls are factory-installed and wired, with room thermostats available as accessories. Low voltage controls eliminate expensive, permanent line voltage wiring to thermostat or control switch, and the gas valve is operated on 24 volts to allow the use of bell wire for connection of thermostats.

More information? Circle Item 10, postcard, last page.

New Traps Are Lighter

Float and thermostatic traps of improved design, Series 27, are made in five sizes with ¾, 1, 1¼, 1½ and 2 inch tappings by Warren Webster & Co., Camden, N. J.

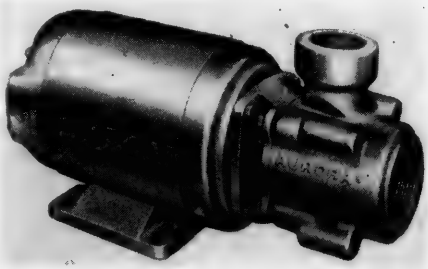
All sizes have a stainless steel water valve and seat in which the valve operating parts are also 18-8 stainless steel stampings. Increased full flooded water capacity is obtained with quick and positive action provided by a double fulcrum arrangement. The thermostatic bypass is provided with a rugged, small diameter, genuine Sylphon bellows for automatic air venting.

Interior mechanism is attached to the cover and removable from the trap body without disturbing pipe connections. Bodies and covers are of semi-steel iron castings. The compactness of the new series is emphasized by comparison of new 2-inch size with its predecessor. The new model weighs approximately 39 lb while the model replaced weighed approximately 80 lb.

More information? Circle Item 11, postcard, last page.

Close-Coupled Pumps

Announcement of a line of Centri-Pac close-coupled pumps available in 21 sizes from 1/6 to 5 hp, with capacities to 150 gpm and heads to 140 ft, is made by Aurora Pump Div., The New York Air Brake Co., Aurora, Ill.



Suited for use as integral parts of original manufacturers products such as air conditioning units, cooling towers, evaporator coolers, hot water circulators, they are also recommended for general service.

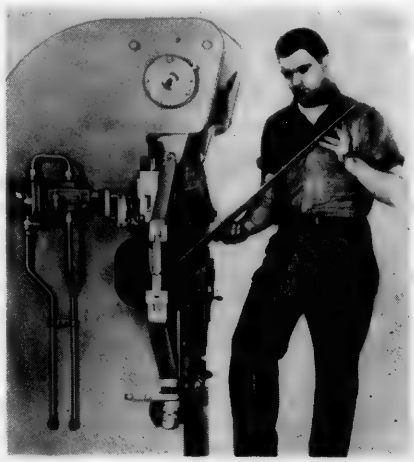
These end suction pumps operate at 3500 rpm. They have low NPSH characteristics and impellers are exactly balanced for smooth, quiet operation, the company states. Mechanical seals have stainless steel parts with high-quality carbon stationary seal rings. There are a minimum of rubber parts in seal for best performance on hot liquid applications.

More information? Circle Item 12, postcard, last page.

Brake Has Special Control

A new accessory for all hydraulically operated Di-Acro press brakes called Let-up Control is said to eliminate whipping and resultant kinking of sheet material during forming operations according to the manufacturer, O'Neil-Irwin Mfg. Co., Lake City, Minn.

Basic element in the control is an adjustable flow control valve. Long sheets can be handled safely and efficiently, the company says, because the speed of the ram



can be reduced up to 50% just prior to the time that the die in the ram makes contact with the material to be formed. While the form part of the stroke is at slow speed, the return stroke is at maximum speed.

Adjustment of the control is made on a calibrated gage which is mechanically linked to a two-way valve which opens and closes to allow hydraulic oil to flow through the flow control valve. Reduction of ram speed is particularly desirable when long sheets of material are being formed because the accident hazard for operators is reduced and the sheet materials are easier to handle.

More information? Circle Item 13, postcard, last page.

Centrifugal Water Chillers

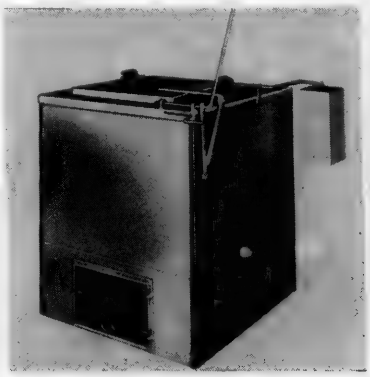
Announcement of a line of centrifugal water chiller units is made by Airtemp Div., Chrysler Corp., Dayton, Ohio. Initial series will include 150, 200, 250, 300, 400, and 500-hp models, operating at 3600 rpm.

Design characteristics include: automatic control, accessible hermetic contruction of compressor and motor assembly, sealed 2-stage centrifugal compressor, balanced thrust in compressor and motor assembly, push-button starting and stopping with capacity automatically adjusted to load variations, no field alignment of rotating parts, forced feed lubrication, and operating range from 100% to as low as 10% of rated capacity.

More information? Circle Item 14, postcard, last page.

Odorless, Smokeless Incinerator

The Series S incinerator for industrial and commercial use is announced by Winnen Incinerator Co., Bedford, Ohio. Available in four sizes (7, 10, 15 and 20 bushel capacities) the model features top feed with low loading height, a special dehydrating hearth to dry out refuse



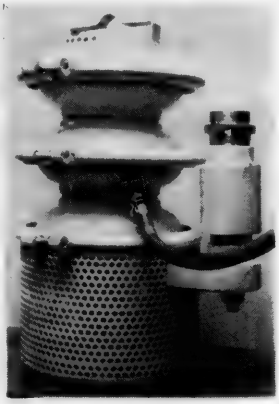
efficiently, three secondary expansion chambers with extra long firetravel, and down-draft design to eliminate smoke and odor, at a price to compete with units that are without these features.

The incinerator is designed to meet or exceed the requirements of municipal codes. It can be installed indoors or out, and is available for fuel-less operation for burning refuse that is at least 80% dry. Or it can be fired by natural or bottled gas, oil, or electricity. Automatic controls, over-fire burners, and other special equipment are optional. This incinerator can be shipped completely assembled on a steel plate, or knocked-down for assembly on the job.

More information? Circle Item 15, postcard, last page.

Diaphragm-Type, Pneumatic Pump

A diaphragm type, pneumatic pump for high head pumping has been announced by the Layton Company, Inc., Cudahy, Wis. This light and compact pump is built for construction, mining and manufacturing operations. It is an excellent sump-pump for tunnel work to keep headings dry and is readily adaptable to deep shaft work where it will pump with a head of 100 feet or more. The pump can operate in a shallow trench and is well suited for operation and portability along the top of a trench. One man can move it as work progresses, without interference with routine duties.



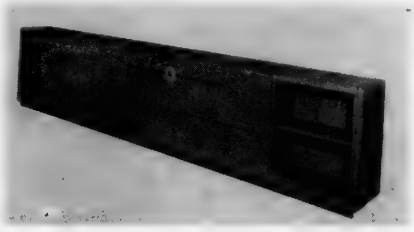
Safety makes it desirable for use in industrial plants. It is fire-proof, explosion-proof and leaves no odors. gases or smoke because it operates by air only. The pump is quiet, making it applicable for indoor work, night operation, or hospital zones.

The pump ejects fluids with 60% solids and highly abrasive liquids. Fluids and materials are bypassed from suction line directly into discharge outlet and do not contact any working parts. It is 22 inches high, 12 inches in diameter, and weighs 65 lb.

More information? Circle Item 16, postcard, last page.

Classroom Air Conditioner

Its 1957 model classroom air conditioner, the HerNel-Cool II, is introduced by Herman Nelson Co., Div. of American Air Filter Co., Louisville, Ky. The new year-round unit ventilator for schools features several basic improvements, including the company's draft-stop system of controlling window downdrafts in wintertime; a new



cleanable drain collector beneath the piping connections for the collection of condensate; larger end panels for easier accessibility for servicing; a modulating by-pass damper control, with a continuously-cold cooling element for better humidity and odor control; a complete range of color combinations; and a selection of attractive plastic low reflectance top coverings.

An advantage of the unit is that it may be installed now for use as a unit ventilator to provide automatically controlled winter heating, and all year ventilating and ventilation cooling. All but hot weather needs are satisfied. If, however, summer air conditioning is required, the addition of a water chiller in the boiler room is all that it takes to convert the system for year-round air conditioning. Nothing needs to be done to the unit ventilators, the piping system, or the automatic controls.

More information? Circle Item 17, postcard, last page.

Packaged Chillers

A series of six packaged chillers in its Flow-Cold line is announced by Acme Industries, Inc., Jackson, Mich. Capacities range from 3 through 20 tons.

Controls are enclosed in a protective steel cabinet. The cabinet's hinged door for access to principal operating controls has a handle with integral padlock hasp. Reason for the door-locking innovation is to provide a means by which unauthorized personnel can be prevented from tampering with unit and thus save possible expensive equipment breakdowns.

Unit requires no cabinet or other special enclosure for sound-proofing, the company states. The V-type compressor is statically and dynamically balanced to minimize vibration.

More information? Circle Item 18, postcard, last page.

Multi-coil Gas Water Heater

For commercial and industrial water heating, where draws of hot water are heavy within a limited time period, Ruud Manufacturing Co., Kalamazoo, Mich., is now marketing the Model 300A multi-coil automatic gas water heater.

Designed for use with natural, mixed, manufactured and LP gases, this circulating tank water heater is recommended to meet high or intermittent-peak demands in such places as industrial plants, schools, and stadia; for sprinkler system towers to maintain above-freezing temperatures in wooden or metal tanks; for swimming pools; and for semi-continuous demands in commercial processing, automatic car washes, laundries, and similar applications where draws are of long duration.

The model is approved by AGA as a circulating tank water heater, and designed for use connected to an auxiliary storage tank. With four horizontal coils, each independently removable, the heater occupies a floor space of 26 by 38 inches. It is 50½ inches high and weighs 390 lb. The Btu input is 285,000, and the recovery rate is 239.4 gph at 100-deg F temperature rise.

More information? Circle Item 19, postcard, last page.

(Continued on page 122)

DIRECT, AUTOMATIC, VOLUME CONTROL

***Direct* volume control without the use of a sensing instrument is exclusive in Buensod Dual-Duct air mixing units.**

Buensod units are being installed in more and more structures — new and renovated. Consider them for your next project!

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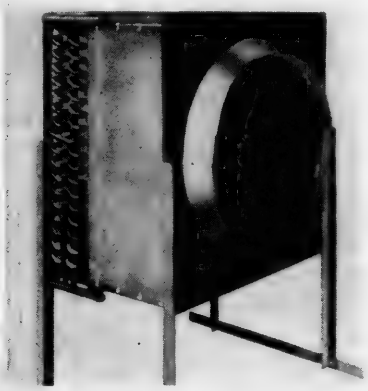
Orlando, Fla., H. L. McMurry & Co.
Philadelphia, James R. McQuaide
Pittsburgh, Glassner Equipment Co.
Portland, Ore., Mead & Associates
Richmond, Va., Laurence Trant & Co.
St. Louis, D. S. Anderson Co.
San Francisco, H. W. Baker Co.
Seattle, George E. Mead Co.
Shreveport, R. F. Zimmerman & Co.
Tampa, Fla., H. L. McMurry & Co.
Toledo, Air Handling Products Co.
Washington, D.C., Lancaster May & Co.

(Continued from page 120)

Air-Cooled Condenser

Dricon air-cooled condenser featuring balanced circuiting, has been marketed by Recold Corp., Los Angeles, Calif.

The circuiting increases the efficiency of a condenser coil. When condensers are headered across the top and bottom, the company says, there is a greater temperature difference between air and refrigerant at the first row



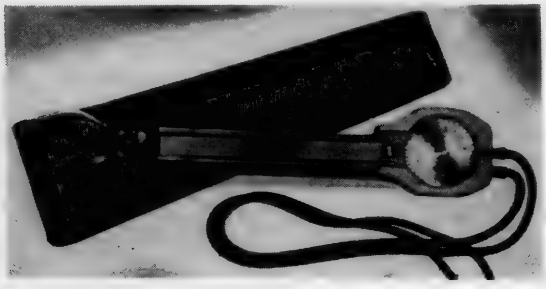
of coils than the last, and the first row will tend to fill up with liquid while the last row has much less capacity. By crossing the circuits, the company claims it balances the amount of work done by each circuit, thereby increasing the efficiency of the coil.

Other characteristics of the condenser include its adjustable angle iron stand furnished on all units; large, slow-speed, belt-driven fans, galvanized housing, copper tube, aluminum fin, coils; strong fan guard; precision ground shaft; self-aligning ball bearings; and motor located inside unit for weather protection.

More information? Circle Item 20, postcard, last page.

Range Finder for Engineers

An instrument for easily and quickly measuring distances from 8 to 100 ft, especially distances to inaccessible objects and places, is announced by Edmund Scientific Co., Barrington, N. J. This range finder has a 6-inch base, easily carried in pocket. It saves time and money in speeding up outdoor construction and maintenance work, company states.



Operation of range finder is based on coincidence of two images: one image is seen in its natural color and the other image is seen in a strongly contrasted gold color. Upon sighting through the eyepiece both images will be seen. By turning the knob the white image will move either toward or away from the gold image. Knob is turned until the two images coincide perfectly. Image will suddenly appear to be sharp, clear, and strongly contrasted. When this occurs, finder is in perfect alignment. Operator reads distance to the object sighted on dial. Accuracy is assured with 2%.

Supplied with a top grain, genuine leather carrying case, it is priced at thirty-two dollars and fifty cents, postpaid.

More information? Circle Item 21, postcard, last page.

Air-Cooled Liquid Chillers

Two new models of air-cooled liquid chillers incorporating features designed to increase flexibility and facilitate installation have been announced by American Coils Co., Farmingdale, N. J.

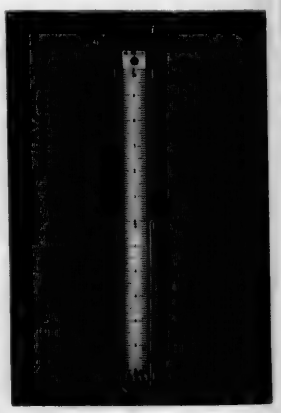
The models are the ACI-AA, a self contained unit with compressor, chiller and air-cooled condenser within one cabinet available in 2, 3 and 5 hp sizes and the ACI-AR, a remote air-cooled condenser available in all sizes from 3 through 15 hp. Both models use air-cooled condensers and are intended for use wherever water cooling is called for in industrial processing or air conditioning.

More information? Circle Item 22, postcard, last page.

General-Duty Manometers

A line of low-cost manometers for general use as light pressure and vacuum indicators is announced by the F. W. Dwyer Mfg. Co., Michigan City, Ind.

Because of its economy, versatility and high degree of accuracy, The Series 1225 manometer is well suited for determining velocity and static pressures, leakage, fan and blower efficiency, resistance through filters, gas pressure, and many other measurements, the company says.

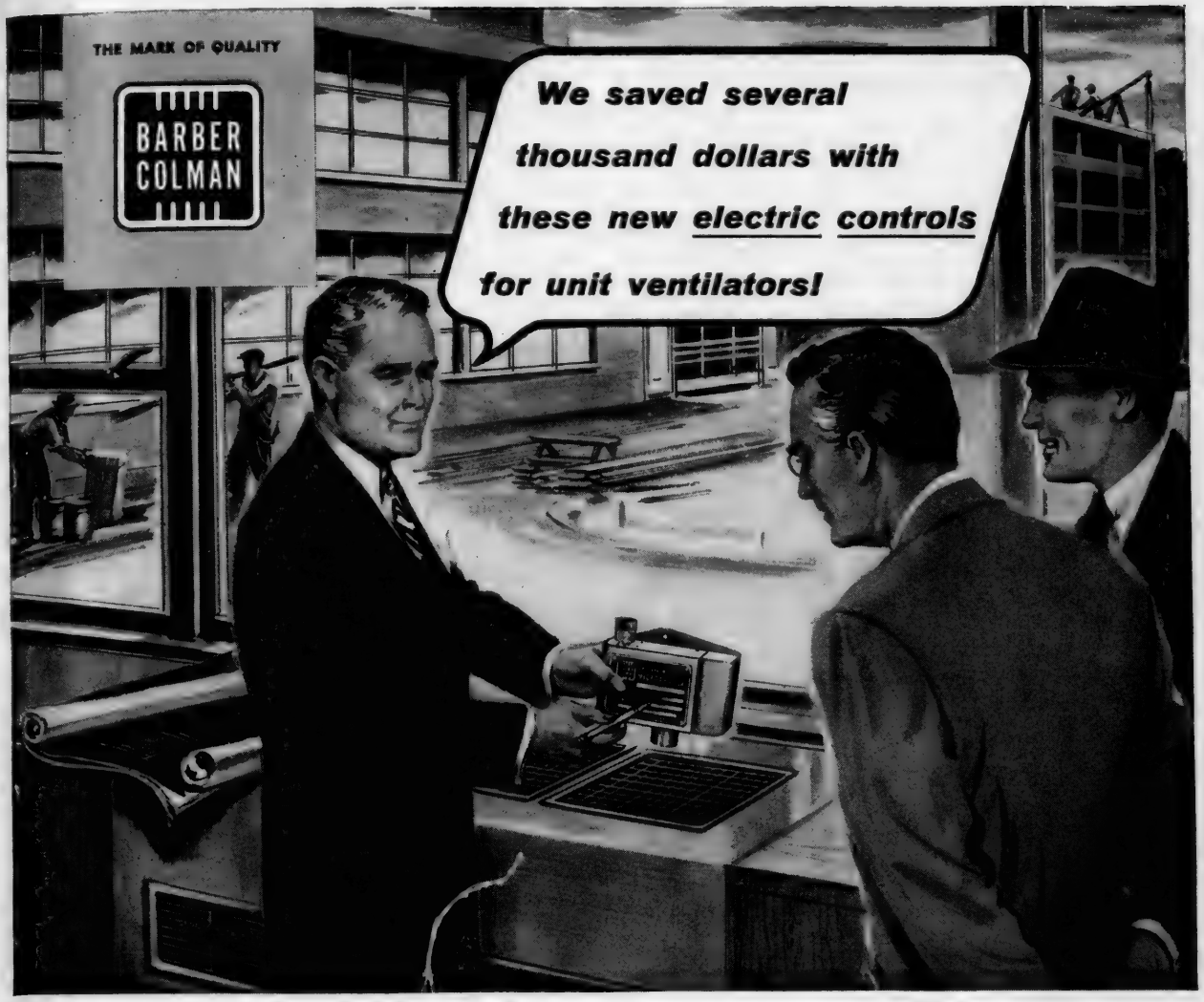


The instruments are now available in three sizes, 6, 12 and 18 inches with either straight or inverted *U* connections for rubber tubing at the top. Double columns are constructed of clear heavy-walled Butyrate plastic tubing. A durable center-mounted fiber scale, dead white with black silk-screened graduates and figures assures good legibility and freedom from parallax error.

Face of the scale is protected by a soil-proof lacquer coating and the complete scale assembly is vertically adjustable for precise zeroing.

More information? Circle Item 23, postcard, last page.

(Continued on page 124)


THE MARK OF QUALITY
BARBER COLMAN
We saved several thousand dollars with these new electric controls for unit ventilators!

Ask your engineer or architect, who knows, about the better temperature control and substantial savings now possible... with Barber-Colman's exclusive electric control systems

If you are planning to install unit ventilators in your classrooms, here's good news for you. New electric automatic controls recently developed by Barber-Colman Company assure *more* stable classroom temperature and fresh air supply — and *reduce initial costs* substantially! And because these new controls are completely enclosed in the unit ventilator, settings can be changed only by your authorized personnel.

Designed specifically for today's modern schools, this exclusive unit ventilator control system is your guarantee of ideal "classroom weather" with important dollar savings on initial unit costs . . . installation costs . . . and operating costs.

Be sure to ask your engineer or architect about this important equipment or contact your nearest Barber-Colman field office, located in all principal cities, for additional facts and application data on unit ventilator control.

send today!

The full story on "Better Control Electrically" — specially written and illustrated for school officials. Covers control of all major types of heating and ventilation. See pages 10 and 11 for unit ventilator systems. Free.

BARBER-COLMAN COMPANY

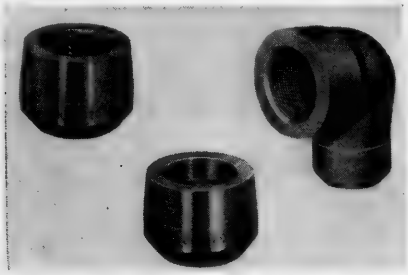
Dept. R, 1302 Rock Street, Rockford, Illinois • Field Offices in principal cities

Automatic Controls • Small Motors • Air Distribution Products • Industrial Instruments • Aircraft Controls • Electrical Components • Overdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

(Continued from page 122)

Universal Outlet Fittings

W-S Fittings Div., H. K. Porter Co., Inc., Roselle, N. J., is now in full production on a new line of easy-to-install branch outlet connections for pipelines, tanks and pressure vessels. The fittings named Couplets, were designed to function as a universal outlet fitting. On most tank, vessel and larger pipeline applications, the fittings are used without modification. On the few applications



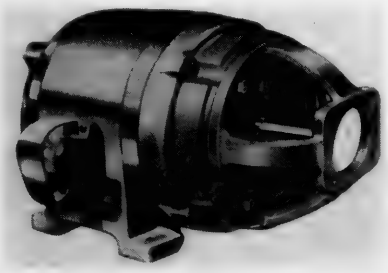
where attachment is to be made to a small diameter pipe, the fitting is easily modified by contouring the welding end with an acetylene torch to mate with the curvature of the pipe diameter.

Made with extra length and heavier wall to permit contouring without detriment to the strength of the fitting, to the weld, or to the threaded or socket end, fittings are available in sizes ¼ through 2 inches with screw-end or socket-welding end connections. They can be obtained in forged carbon steel (ASTM A-105, Grade 2), 3000 lb W.O.G. class screw-end type, and schedule 40-80 socket-welding type.

More information? Circle Item 24, postcard, last page.

Motors for Hydraulic Pumps

A special series of motors, designed particularly for hydraulic pumps, has been developed by U. S. Electrical Motors Inc., Los Angeles, Calif. These motors, available in dripproof, totally-enclosed, and explosion-proof designs, incorporate a face type registered bracket for mounting the pump on the motor.



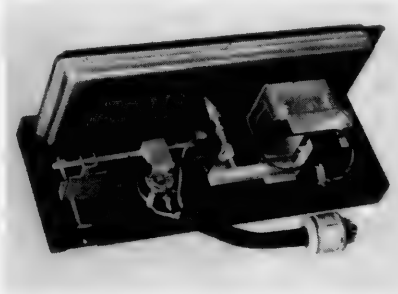
This method of coupling provides many advantages. Separate base plates or platforms for mounting the pump are eliminated; a shorter, more compact package is achieved; built-in alignment of the pump to motor is insured; and installation time is greatly reduced. The design of the bracket permits easy access to the motor shaft, coupling, and pump mounting bolts.

In the dripproof enclosure, Type H motors are available to 20 hp and Type SC to 125 hp. Totally-enclosed and explosion-proof designs are available in Types J and E to 10 hp, and in Types SD and SE to 125 hp. For double-end pump installations where low pressure-high volume and high pressure-low volume pumping is required, the company's hydraulic pump motors can be supplied with double-end shafts and mounting brackets for supporting two pumps.

More information? Circle Item 25, postcard, last page.

Automatic Draft Controller

Designed by Cleveland Fuel Equipment Co., Cleveland, Ohio, to eliminate instability and hunting by automatic draft control systems, the Proportional Band draft controller operates at the draft set point desired, after one simple field adjustment.



Fluctuations and pulsations of the furnace are filtered out of the control system by the controller without sacrificing resolution sensitivity. This allows the actuator to establish a definite damper position corresponding to any given firing rate. A steady pre-determined over-fire draft condition (either positive or negative pressure) is maintained by the unit. Efficiency of the boiler plant is increased and fuel bills are reduced.

Units are shipped from the factory, pre-set with a narrow proportional band, to give fast control response. Compact in design, the draft controller is housed in a rugged dirt and dust-free metal case to assure long service and maintenance-free operation.

More information? Circle Item 26, postcard, last page.

Laboratory Sink Faucet

T & S Brass & Bronze Works, Inc., Westbury, L. I., N. Y., manufacturers of plumbing specialties, announces a self-closing gooseneck faucet for general cleanup sinks in laboratories, schools, and institutions.

Model B-4210 provides virtually a fingertip control with its ball bearing type faucet handle for easy, variable water flow. Water shuts off automatically when faucet handle is released. The unit measures 12 inches from center of faucet to top of gooseneck, and 7¾ inches to the tip of the pressure nozzle. It is furnished with a ½-inch IPS flanged female inlet and a choice of hot or cold index button.

More information? Circle Item 27, postcard, last page.

(Continued on page 126)

"TS" TURBINE PUMP
Designed for boilers up to 250 hp and discharge pressures up to 150 lbs.
"SV" CONDENSATE PUMP
"CVS" VERTICAL PUMP
Heavy duty duplex unit with two float controls
"CVF" VERTICAL PUMP
"HS" CONDENSATE PUMP
Skidmore Pumps
for top performance there is no equal
Let us tell you more about the many advantages of these famous SKIDMORE Pumps . . .

Let us send data—

Write us the type of Skidmore Pump you are interested in — we'll send brochure with full information.

- **Compact, modern design — but readily accessible for inspection.**
- **Built to every installation requirement — in single and duplex units, assuring maximum efficiency.**
- **Completely assembled in wide range of capacities — pre-tested and ready for immediate shipment.**

SKIDMORE PUMPS

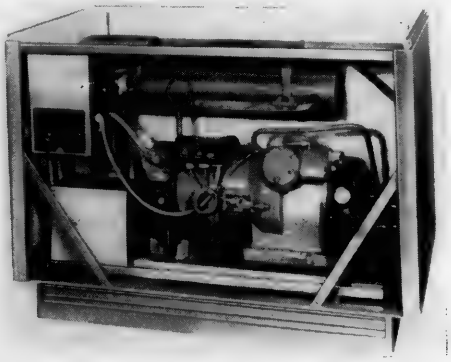
SKIDMORE CORPORATION ST. JOSEPH MICHIGAN

(Continued from page 124)

Packaged Water Chiller

A packaged water chiller available in 3 and 5-hp sizes that requires no field refrigerant piping and is designed to meet residential, commercial and industrial requirements is introduced by Worthington Corp., Harrison, N. J.

The compact unit consists of water chiller, compressor, water-cooled condenser and controls, all factory assembled into an insulated, bonderized steel cabinet requiring 8.3 sq ft of floor.



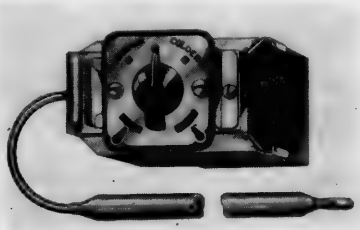
Equipped with automatic controls which include an *on* and *off* switch; a thermometer that can be set to maintain desired water temperature; a freeze-up thermostat, factory set at 38 deg F, to prevent water freezing within chiller; and a magnetic starter that controls compressor operation, it is wired at the factory, and can operate on 3 phase 60 cycle, 208 and 220 volts, or 1 phase 60 cycle, 230 volts.

Field-serviceable hermetic compressor is of horizontal shaft type, mounted on rubber vibration absorbers. equipped with suction gas-cooled motor. The shell and coil condenser has water connections to pipe in field for either single or double circuit.

More information? Circle Item 28, postcard, last page.

Air Conditioning Control

A compact control, designed to automatically operate up to four individual devices on air conditioning systems, has been introduced by Ranco Inc., Columbus, Ohio. The model, called the C17, derives its versatility from two electrically-independent, single pole, double throw



switches. Both are operated by a single temperature power element and permit up to 4 switching combinations for cut-in and cut-out operation.

Individual heating and cooling components such as compressors, circulating fans, solenoid operated reversing valves, resistance heaters and alarm or signal mechanisms can thus be electrically arranged in combinations to meet the requirements of the system. For example, the control accommodates two-stage cooling when it is used in conjunction with two compressors. And it is applicable to heating-cooling operations when used with either a compressor and a solenoid-operated reversing valve, or a compressor and a resistance heater.

More information? Circle Item 29, postcard, last page.

Fiberboard Sheeting

Development of an improved fiberboard sheeting material to make it applicable to a wide range of industrial uses, is announced by Industrial Div., Armstrong Cork Co., Lancaster, Pa.

The new sheets, developed through research as a successor to the company's former fiberboard sheet material, have improved characteristics which make the product increasingly acceptable as a lightweight, economical material.

Among the uses for the sheets are dividers for compartments of room air-conditioners, a job once performed by metal and plastic panels, and many other applications. In effect, a dimensionally sized panel of sheeting can be used in any manufacturing operation where a rigid metal panel or plastic sheet is being used to separate unit components. In many cases, it has been found that the light weight of the material helps to reduce the total weight of the end product.

The material can be notched, scored, or die-cut accurately and cleanly to any desired shape. Steel-rule dies are all that are required for any die-cutting operation.

More information? Circle Item 30, postcard, last page.

Vacuum Breaker and Air Vent

New Model P-646 valves for tank or fluid systems, manufactured by Circle Seal Products Co., Pasadena, Calif., serve the dual function of breaking vacuum automatically in draining, and bleeding air displaced in filling.

Normally the valve seals dead tight preventing loss of system pressure. When the fluid is being withdrawn from the system or temperature drops, the valve opens automatically to break the vacuum and permit free flow. A manual over-ride is provided to permit holding the valve open to release entrapped air when the system is being filled.

The company's O-ring design guarantees dead-tight shut off to hold tank pressure. Maintenance of the valve is simple. The floating poppet design provides self-cleaning operation. Made of lightweight aluminum, the valve is manufactured in ½ and ¾-inch pipe sizes.

More information? Circle Item 31, postcard, last page.

(Continued on page 128)

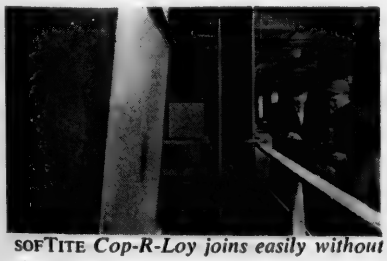
Architects	Shreve, Lamb & Harmon Associates — for the Department of Public Works The City of New York
Builders	Castagna & Son Inc. and H. R. H. Construction Co.
Contractors	Alpine Sheet Metal & Ventilating Co., Inc.

As in the Supreme Court Building

Brooklyn, New York

Ducts made of SOFTITE *Cop-R-Loy form quickly without preliminary cutting.*

Ductile, tight-coated SOFTITE *Cop-R-Loy is ideal for long spans.*



SOFTITE *Cop-R-Loy joins easily without shearing waste.*

get longer lasting ducts with Wheeling SOFTITE® COP-R-LOY® Galvanized Sheets

In about October 1958, the new $20 million Supreme Court Building in Brooklyn, N. Y. will be completed. In it you'll find more than 365 tons of air conditioning, heating and ventilating ducts made of Wheeling SOFTITE Cop-R-Loy Galvanized Sheets.

By choosing SOFTITE Cop-R-Loy, the builders and sub-contractors were assured of the ultimate in long-lasting, easy-working, good-looking galvanized sheets.

For proof of SOFTITE Cop-R-Loy's longer life and for full details contact the Wheeling warehouse or sales office nearest you.

Wheeling

WHEELING CORRUGATING COMPANY, WHEELING, W. VA.

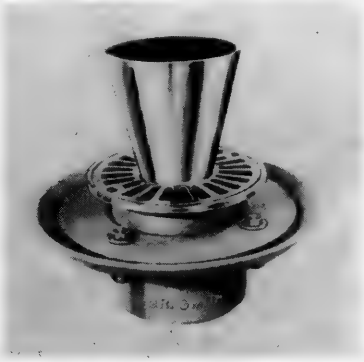
IT'S WHEELING STEEL

IMMEDIATE DELIVERY ON ALL WAREHOUSE-STOCKED ITEMS FROM THESE WAREHOUSES: BOSTON, BUFFALO, CHICAGO, COLUMBUS, DETROIT, KANSAS CITY, LOUISVILLE, MINNEAPOLIS, NEW ORLEANS, NEW YORK, PHILADELPHIA, RICHMOND, ST. LOUIS. ***SALES OFFICES:*** ATLANTA, HOUSTON

(Continued from page 126)

Equipment Funnel Drain

Introduced by the Jay R. Smith Mfg. Co., Union, N. J., is the Indirect Waste Receptor Funnel Drain. This drain has been designed for installations requiring a permanent drain outlet convenient to equipment or fixtures, which must be continuously or periodically drained but not connected directly to the drainage system.



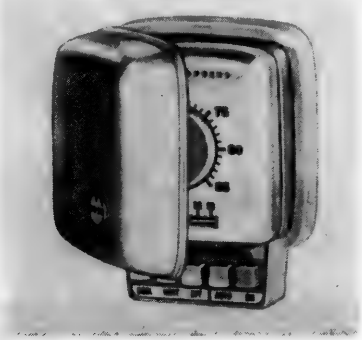
This funnel drain is recommended for installation near equipment such as air conditioners or boilers, where discharge pipes, and blow off valve hoses must have access to drainage; but remain separated from the drainage system by an air gap.

Furnished with a wide funnel top, which provides a non-splash receptable for discharge from the fixture, the base of the funnel is slotted so that it also serves as a supplementary floor drain. Available in bronze or cast iron, this double duty waste receptor and floor drain may be had in various sizes and with different drain bodies to accommodate installations requiring a bottom outlet, side outlet, trap, or backwater valve.

More information? Circle Item 32, postcard, last page.

Thermostat Has Push Button Control

Believed to be the first push-button operated room thermostat in the temperature control industry, the Push-Button heating and cooling thermostat is announced by White-Rodgers Co., St. Louis, Mo. Developed on the



design premise of the proven sales success and marketing appeal that push-buttons have received in other fields, the thermostat is a combination of a versatile new push-button sub-base and the company's Fashion thermostat.

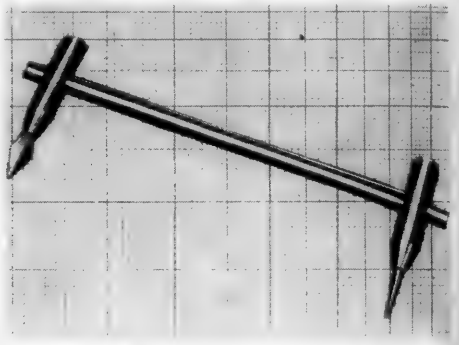
The thermostat has both adjustable anticipation to match the primary heating control, and built-in cooling-anticipation. This combination assures a more uniform room temperature.

Available in combinations to fit most heating-cooling systems, this handsomely styled control offers from two to five push-buttons. Company officials declare the thermostat is very simple to install, due to the ready attachment of sub-base to wall, and thermostat to sub-base. Wires are easily connected to clearly marked terminals, and the dial face with hinged cover is quickly snapped into place.

More information? Circle Item 33, postcard, last page.

Cuts Round Gaskets

Used for cutting round gaskets from asbestos, rubber, fiber, or cork sheets, this versatile tool manufactured by The Garlock Packing Co., Palmyra, N. Y.,, can also be used for precision scribing and layout work.



Known as the B Set, it comes in a case that holds the hexagonal-shaped bar on which is mounted the knife and point holders. The tool is adjustable to cut gaskets with 1¼ to 22¼-inch outside diameters. Samples of four widely used sheet packings are included with the cutter sets.

More information? Circle Item 34, postcard, last page.

Insert-Type Flanges and Fittings

Maintenance and repairs to process piping, especially in hazardous areas, frequently require costly down time because of welding required. It is possible to tie in new equipment and break into existing lines and headers without resorting to welding, with Speedline insert flanges and fittings manufactured by Horace T. Potts Co., Philadelphia, Pa.

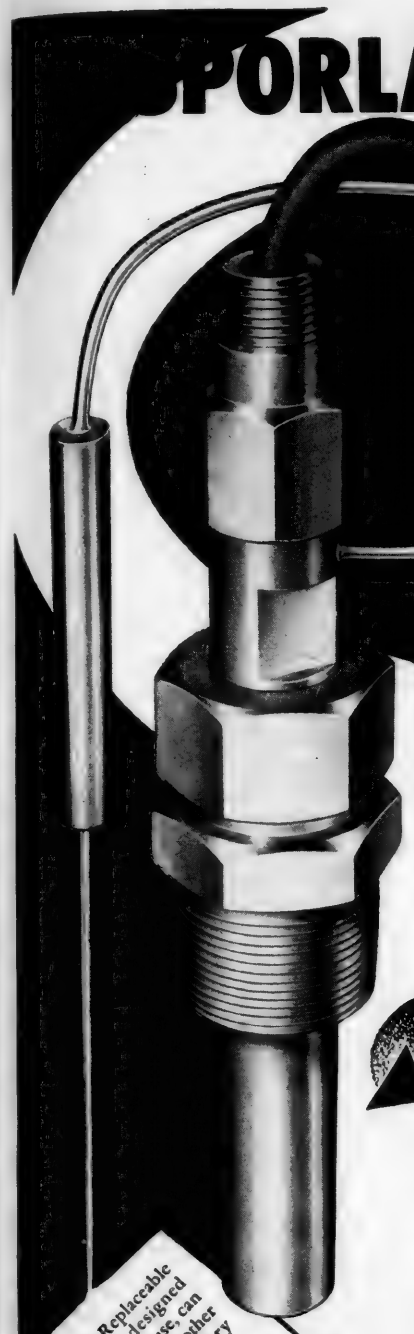
Easy to perform, expanding of pipe or stainless steel fittings into the company's insert flanges minimizes time out of production for process lines and gives strong leak-proof joints. Press fit between insert and flange assures that the pipe or fitting can be expanded into the ferrule permanently. The tangential feature (extra straight section) on all the company's formed fittings facilitates attachment of insert flanges.

More information? Circle Item 35, postcard, last page.

(Continued on page 131)

SPORLAN LEVEL MASTER CONTROL

LMC



is the PEAK PERFORMANCE Answer to all FLOODED SYSTEMS

Here's why!

Because only the Sporlan Level-Master Control uses standard Sporlan thermostatic expansion valves with matching level-master elements. This perfect combination of LMC element and thermostatic expansion valve assures a positive liquid level control for Ammonia and Refrigerant 12 up to 100 Tons... Refrigerant 22, up to 180 Tons.

READ THESE LMC PEAK PERFORMANCE FEATURES CAREFULLY!

MODULATED FLOW. The Level-Master Control provides a modulated flow and maintains practically a static liquid level in the low side.

NO MOVING PARTS. The insert bulb controlling the liquid level has no moving parts. Control does not operate through use of a mechanical float device of any kind.

SIMPLIFIED AND ECONOMICAL INSTALLATION. The insert bulb can be placed directly in the shell, accumulator or liquid leg for direct contact with refrigerant. Existing float control systems can be easily and economically converted.

NOT AFFECTED BY TURBULENCE. Regardless of any agitation which might occur in the low side, the effect on the Level-Master is merely that of striking a mean level and holding that level constant.

TIGHT CLOSING. Tight closing is assured by the spring action in the thermostatic expansion valve during shut-down periods when the heater element is off and liquid refrigerant is in contact with the bulb. The Peak Performance of Sporlan Thermostatic Expansion Valves has been proven over a period of many years.

Only Sporlan Replaceable Core Catch-Alls designed especially for Ammonia use, can effectively remove scale and other foreign matter that ordinary strainers miss.

Stop pitting or wire drawing of pins and seats in Solenoids and Thermostatic Expansion Valves, and excessive wear of compressor parts. Install a Sporlan Replaceable Core Catch-All in your Ammonia system now!

Write for Sporlan Bulletin 60-15 today. Also order the proper Catch-All for use with the Sporlan Level-Master Control and get Peak Performance on all your flooded jobs.

SPORLAN VALVE COMPANY

7525 SUSSEX AVENUE • ST. LOUIS 17, MO.

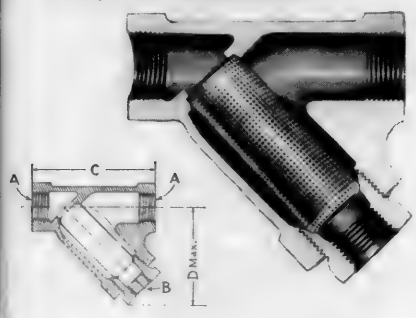
EXPORT DEPT. AD. AURIEMA, INC. - 89 BROAD STREET, NEW YORK 4, N. Y.

HOFFMAN

"Y" STRAINERS
125-250 PSI
INSTALL HOFFMAN STRAINERS AHEAD OF ALL VALVES, PUMPS AND TRAPS ESPECIALLY ON NEW INSTALLATIONS

SERIES No. 400A

125 PSI—SEMI-STEEL



NO. 400-A "Y" STRAINER

Hoffman No. 400-A "Y" type, self cleaning dirt strainers are furnished with a .025 brass screen with .045 perforations. Precision machined, semi-steel body. For use on steam, water, oil, air, or gas service. Made in ½" through 2" pipe sizes. Maximum pressure 125 lbs. Can also be furnished with monel or stainless steel screens.

ROUGH-IN DIMENSIONS			
Size A	Cleanout B	Length C	D
½"	⅜"	3 15/32"	3"
¾"	½"	4 1/16"	3 7/16"
1"	¾"	4 3/4"	4 1/4"
1 ¼"	1"	5 7/16"	4 1/2"
1 ½"	1 ¼"	6 5/16"	5 5/16"
2"	1 ½"	7 7/16"	6 1/16"

125# SEMI-STEEL BODY—.025 BRASS SCREEN WITH .045 PERFORATIONS

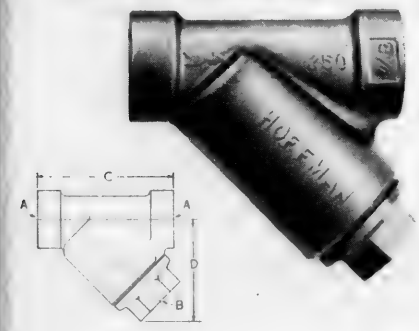
SIZE	SCREEN RATIO* .045 Perf.	WEIGHT LBS.
½"	5 to 1	1 ⅛
¾"	4.46 to 1	2 ⅛
1"	4.1 to 1	3 ⅜
1 ¼"	3.26 to 1	5 ¼
1 ½"	3.13 to 1	7 ½
2"	3.3 to 1	11

Monel and stainless steel screens with .033 or .045 perforations and brass screens with .033 perforations available at additional cost.

*Ratio of total effective screen area to the inside pipe area.

SERIES No. 411A

250 PSI—SEMI-STEEL



NO. 411-A "Y" STRAINER

Hoffman No. 411-A "Y" strainers can be used for steam, water, oil, air, or gas service. Made of semi-steel, these strainers are precision machined for correct alignment and easy removal of the strainer screen. Available in sizes ½" through 3", with a .025 monel screen with .045 perforations. Brass and stainless steel screens available. Max. press.: 250 P.S.I.

ROUGH-IN DIMENSIONS			
Size A	Cleanout B	C	D
½"	½"	3 7/16"	2 13/16"
¾"	½"	4 1/4"	3 1/16"
1"	½"	5"	3 3/16"
1 ¼"	½"	5 7/16"	4 1/16"
1 ½"	¾"	6 3/16"	4 3/16"
2"	¾"	7 7/16"	6"
2 ½"	1 ¼"	9"	6 1/16"
3"	1 ¼"	10 3/4"	8"

250# SEMI-STEEL BODY—.025 MONEL SCREEN WITH .045 PERFORATIONS

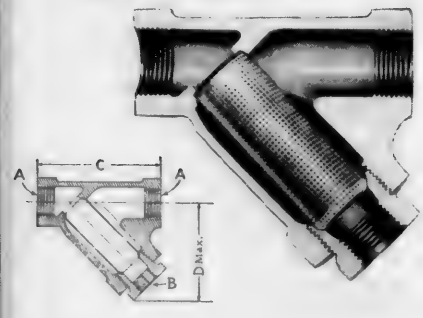
SIZE	SCREEN RATIO* .045 Perf.	WEIGHT LBS.
½"	6.3 to 1	1 ¾
¾"	6 to 1	2 ½
1"	5.5 to 1	4 ½
1 ¼"	5.2 to 1	6 ½
1 ½"	5 to 1	8 ½
2"	4.8 to 1	13 ½
2 ½"	4.2 to 1	19
3"	3.7 to 1	30

Brass and stainless steel screens with .033 or .045 perforations, and monel screens with .033 perforations, available at additional cost.

*Ratio of total effective screen area to the inside pipe area.

SERIES No. 421A

250 PSI—BRASS



NO. 421-A "Y" STRAINER

Hoffman No. 421-A—cast brass, precision machined, "Y" strainers are designed for use on steam, air, gas, water, and oil service. Available in sizes ½" through 3", with a .025 monel screen with .045 perforations. Stainless steel and brass screens available. Maximum pressure: 250 P.S.I.

ROUGH-IN DIMENSIONS			
Size A	Cleanout B	C	D
½"	⅜"	3 15/32"	3"
¾"	½"	4 1/16"	3 7/16"
1"	¾"	4 3/4"	4 1/4"
1 ¼"	1"	5 7/16"	4 1/2"
1 ½"	1 ¼"	6 3/16"	5 5/16"
2"	1 ½"	7 7/16"	6 1/16"
2 ½"	1 ¼"	9"	6 1/16"
3"	1 ¼"	10 3/4"	8"

250# BRASS BODY—.025 MONEL SCREEN WITH .045 PERFORATIONS

SIZE	SCREEN RATIO* .045 Perf.	WEIGHT LBS.
½"	5 to 1	1 ¾
¾"	4.5 to 1	2 ½
1"	4.1 to 1	4
1 ¼"	3.3 to 1	5 ¾
1 ½"	3.3 to 1	7 ¾
2"	3.3 to 1	12 ½
2 ½"	4.2 to 1	22 ½
3"	3.7 to 1	35 ½

Brass and stainless steel screens with .033 or .045 perforations, and monel screens with .033 perforations, available at additional cost.

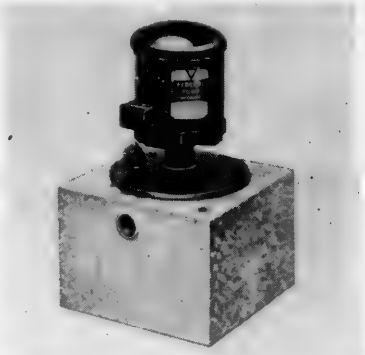
*Ratio of total effective screen area to the inside pipe area.

Cast Brass "Y" Strainers available for 400 PSI max. oper. pressure.

(Continued from page 128)

Condensation Return Unit

This vertical condensation return unit, Type MCH-120, was developed by Federal Pump Corp., Brooklyn, N. Y., in response to demand for an efficient, compact, and quiet operating condensation unit with a minimum EDR rating at low pressure.



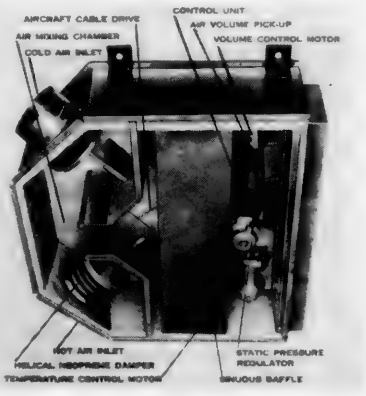
Available in simplex model only, the pump is a vertical, centrifugal type with bronze casing and impeller, and stainless steel shaft. Receiving tank is of heavy, welded, galvanized steel construction with low inlet, suitable for installation on floor or in shallow pit.

Motor is ⅓ hp, available in 115 or 230 volt models, and automatic control is by heavy duty, snap-action float switch mounted in motor housing. Pump capacity is 1½ gpm and discharge pressure is 20 psig for heating system capacity of 1000 sq ft EDR.

More information? Circle Item 36, postcard, last page.

High Velocity Air Valve

The Kno-Draft Series 45 valve attenuators take their name from the 45 deg air inlet connections which permit simple, direct connection to any type of duct layout. This addition to the group of dual duct air conditioning pressure and velocity reduction devices, available from Connor Engineering Corp., Danbury, Conn., will appeal to both engineers and contractors.



One thermostat-controlled motor proportions both hot and cold air flow. A second motor, actuated by a pressure regulator, maintains constant volume regardless of air pressure fluctuations at the inlets. All controls and linkage can be reached through the diffuser or grille. Air volume of each valve may be pre-balanced at the factory or adjusted by one easily reached control during or after installation. Where constant volume is not required one motor and pressure relay are replaced by a manual setting device.

High frequency sound waves are blocked by a sinuous baffle, and a deep lining absorbs low frequencies. All interior surfaces are thermally and acoustically insulated. The valve attenuators are made for capacities of 140 to 1200 cfm, in above-ceiling and under-window models.

More information? Circle Item 37, postcard, last page.

Deep-Well Turbine Pumps

An expanded line of Minuturb turbine pumps produced by The Deming Company, Salem, Ohio, delivers more than 100 gpm from deep wells. The pumps and water systems are designed especially for service in schools, motels, industrial plants, dairies and other locations where more than the normal water supply is required.

New sizes include 4 and 5⅝-inch units powered by 7½ and 10-hp motors. Construction features include a chromium stainless steel shaft, heat treated for resistance to wear and corrosion; vertical hollow shaft motor; bronze, semi-enclosed adjustable impellers; and combination foot valve and strainer that retains water in the column at all times, eliminating pre-lubrication.

More information? Circle Item 38, postcard, last page.

Anti-Sun-Heat Paint in Colors

Plasticool, a sunlight heat reflective coating of plastic resin, is now available in pastel yellow, buff, blue, and green from Coating Laboratories, Inc., Tulsa, Okla. The emulsion is used on commercial and residential buildings and construction.

Non-yellowing and self cleaning, a one-coat application by spray gun is sufficient for all sun-hot surfaces, the company states. Though it may be thinned with water, it is very water-resistant and durable in all types of weather, once it has dried. No primer is necessary. Its life is 4 to 7 years.

Temperature gradient from ceiling to floor of a sealed building which is coated with this paint is between one and two deg F, it is claimed. Under steel roofs, temperatures have been reduced up to 45 deg in summer; under average asphalt roofs, temperatures have fallen 30 deg.

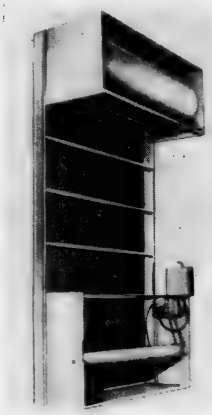
More information? Circle Item 39, postcard, last page.

(Continued on page 132)

(Continued from page 131)

Automatic Dry Air Filter

Deliveries are started on an automatic dry air filter by Farr Company, Los Angeles, Calif. Known as the Roll-Kleen, the filter has glass fiber media which extends from the clean media roll at the top of the unit, over the filter face of the unit, and on to the used media take-up roll at the bottom.



When special instruments sense that air flow through the media has dropped to the allowable, pre-set limits due to accumulated dirt, the take-up roll automatically pulls clean media over the entire filter face. This assures even air distribution across the face of the filtering area, according to the manufacturer.

Other than occasional visual inspection, the unit is virtually maintenance-free, it is claimed. Two maintenance lights, which may be located anywhere, advise when the media is changing as well as when the entire media roll should be replaced. Enough media is contained in each roll to give approximately a year's operation under normal conditions, it is reported.

Units are manufactured in standard widths of 3, 4 and 5 ft with heights ranging from 5 to 15 ft. Units may be joined together to meet any cfm requirements.

More information? Circle Item 40, postcard, last page.

New Water Heater Burner

A new cast iron burner with a horizontal burner flame has helped enable John Wood Mfg. Co., Inc., Conshohocken, Pa., to reduce the overall height of its gas water heaters up to 18½ inches in 20-gal models, 8½ inches in 30, and 8 inches in 40-gal models. Because of its large, circular, horizontal flame pattern, the burner has been named Blue Halo.

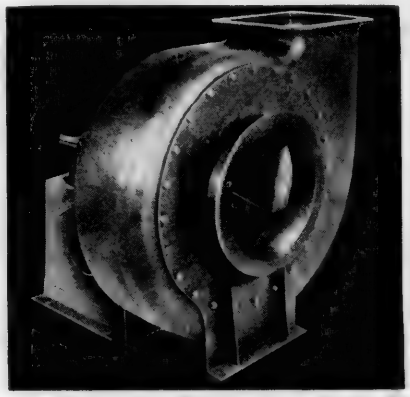
Common for natural, mixed, and LP-gases, the burner has a single annular port with depth three times larger than conventional ports, therefore giving quick flame travel and fast ignition whether flame is hard or soft. Overhang of burner hood prevents clogging. The elimination of spillage and recirculation of gases made possible by the burner design has enabled the company to eliminate the use of inner doors on the combustion chambers of these heaters. This is an important feature because it simplifies installation and servicing.

Pilot flame is located below burner so that burner flame does not affect pilot operation Thermostats in the heaters are located at the bottom-most position in the tank to assure that all water is kept at the thermostat setting. All models are equipped with a hermetically sealed combustion chamber in the firing zone.

More information? Circle Item 41, postcard, last page.

Glass Protects Fans

Type FG exhausters manufactured by Buffalo Forge Co., Buffalo, N. Y., designed for the most severe corrosive air handling jobs are announced by the company. An impact-resistant resin-bonded glass fiber fume fan, it will not support combustion.



Chemical resistance is afforded to a variety of acids, salts, gases, organic materials, and other corrosives in temperature applications up to 225 deg F.

Glass fiber fan housing has integral stainless steel studs molded-in for attachment to the bearing stand. Thus covered, studs are protected from contact with the air stream.

Rotor is a carefully balanced steel wheel with all exposed parts encased in thick glass fiber. Fans are available in standard capacities up to 34,000 cfm at pressures up to 10 inches static.

More information? Circle Item 42, postcard, last page.

Removes CO_2 from Sub

Specially designed for the first atomic submarine, a CO_2-removing unit of stainless steel construction, adaptation of the Girbotol apparatus that is the standard industrial process for separating CO_2 from gaseous mixtures, is designed and manufactured by The Girdler Co., Louisville, Ky., Div. of National Cylinder Gas Company.

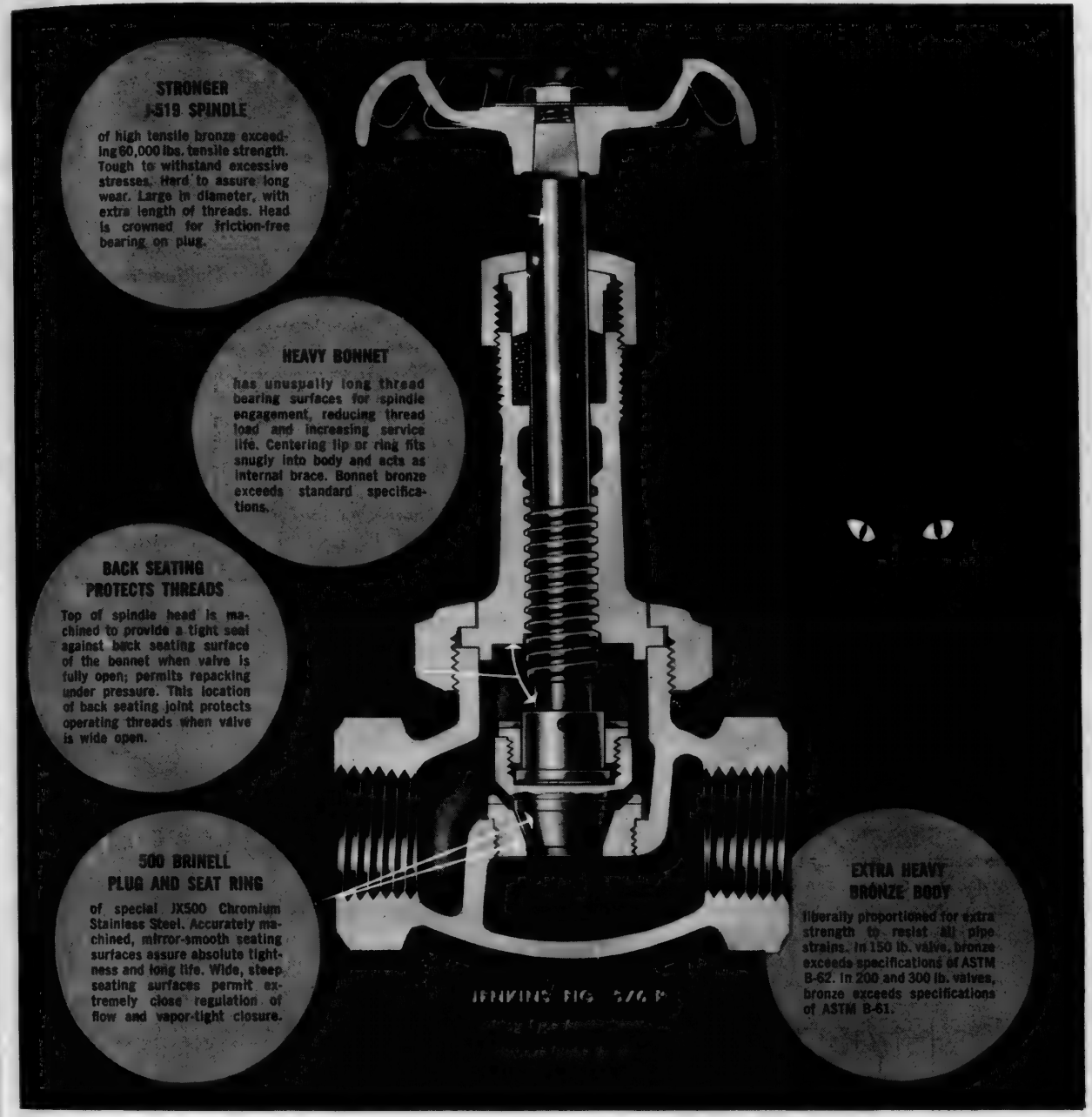
Unit provides clean air to crew members of the Navy's atom-powered submarine, the Nautilus, and is getting its own first real breathing spell in more than 2 years while the sub is docked for re-fueling.

For more than 30,000 miles that the boat was buttoned up and under water, the unit's amine absorbent was extracting excess CO_2 from the air in the sub. Expelled into the sea in compressed form, the waste gas dissolves and leaves no tell-tale bubbles to reveal sub's position.

More information? Circle Item 43, postcard, last page.

(Continued on page 134)

Where valves need 9 lives...


STRONGER
J-519 SPINDLE
of high tensile bronze exceeding 60,000 lbs. tensile strength. Tough to withstand excessive stresses. Hard to assure long wear. Large in diameter, with extra length of threads. Head is crowned for friction-free bearing on plug.
HEAVY BONNET
has unusually long thread bearing surfaces for spindle engagement, reducing thread load and increasing service life. Centering lip or ring fits snugly into body and acts as internal brace. Bonnet bronze exceeds standard specifications.
BACK SEATING
PROTECTS THREADS
Top of spindle head is machined to provide a tight seal against back seating surface of the bonnet when valve is fully open; permits repacking under pressure. This location of back seating joint protects operating threads when valve is wide open.
500 BRINELL
PLUG AND SEAT RING
of special JX500 Chromium Stainless Steel. Accurately machined, mirror-smooth seating surfaces assure absolute tightness and long life. Wide, steep seating surfaces permit extremely close regulation of flow and vapor-tight closure.
EXTRA HEAVY
BRONZE BODY
liberally proportioned for extra strength to resist all pipe strains. In 150 lb. valve, bronze exceeds specifications of ASTM B-62. In 200 and 300 lb. valves, bronze exceeds specifications of ASTM B-61.

Install this JENKINS...made to defeat valve-killers

HERE are just five of the eighteen ways by which Jenkins Plug Type Valves have been engineered for maximum wear in valve-killing services. For any close-control steam service like drains, bypass lines, drips, blowoff, throttling, bleeders . . .

Or where abrasion, entrapped pipe chips, scale or rust tubercles are a problem . . .

You'll cut maintenance and replacement costs by specifying *"Jenkins Plug Type, with the 500 Brinell Stainless Steel Armor Seat"*. In the Jenkins Catalog are 150 lb., 200 lb. and 300 lb., Globe and Angle, screwed or flanged end valves in a full range of sizes. And, they are available quickly from local distributors' stocks.

WRITE us, or ask your Jenkins distributor for descriptive folder No. 202-A. Jenkins Bros., 100 Park Avenue, New York 17.

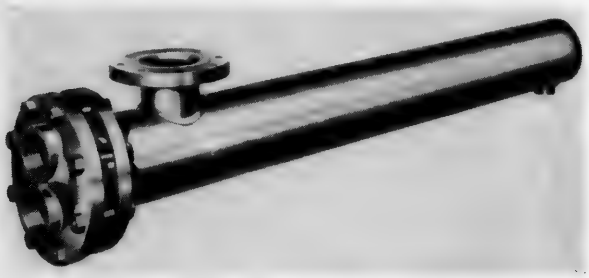
JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
SINCE 1864 TRADE JENKINS MARK

Sold Through Plumbing-Heating and Industrial Distributors

(Continued from page 132)

Heat Exchangers

Several new series of heat exchangers are announced by Taco Heaters Incorporated, Cranston, R. I. All are designed and rated in accordance with the ASME code, ASA, and the thermal standards of the Fuel Oil and



Water Heater Manufacturers Assn., the company states.

Standard 200-psi test pressure units are available in nine diameters from 3 to 20 inches; and 600-psi test pressure units in five diameters from 4 to 12 inches with maximum operating temperature of 450 deg F.

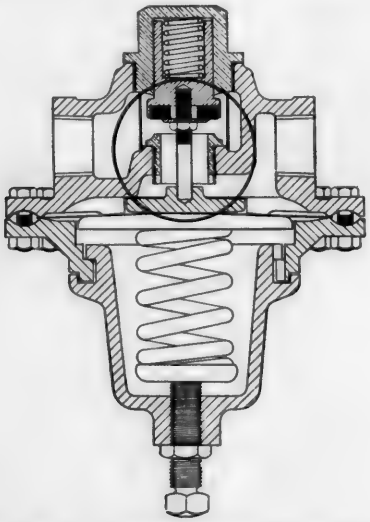
Catalogs showing capacities for many common temperature conditions, and nomographs for making selections for conditions other than those listed are available.

More information? Circle Item 44, postcard, last page.

Steam Pressure Regulator

Design of an improved pressure regulator is announced by Davis Regulator Co., Chicago, Ill. Valve incorporates a larger through passage which gives a greater capacity and also a less turbulent flow pattern through the valve.

Construction is simpler and the valve discs are now interchangeable. User can quickly switch from water service, for example, to steam, gas or air. There is an



added safety factor in that the spring adjustment is made from below rather than from above as in previous models.

Reduced pressure range is from 1 to 100 psi, depending on the size of the valve, with initial pressures as high as 400 psi. Unit features a built-in strainer. Company offers this valve in bronze, semi-steel, or steel body with special alloy trim available if desired. Standard sizes are ⅜, ½, ¾, 1, 1¼ and 2 inches.

More information? Circle Item 45, postcard, last page.

Dolly Moves Loads to 6000 Lb

The already introduced Multiton Roller Skid now has a companion developed by Stokvis-Edera & Co., Inc., Port Washington, N.Y., called Multiton Junior. This has come as a boon to those in need of an inexpensive method with which to handle loads of from 1000 to 6000 lb.

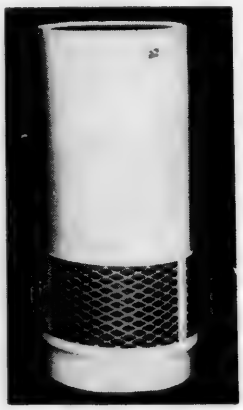
Of all steel construction, the device moves on three 2¼-inch dia rollers, each equipped with precision Neoprene-sealed ball bearings. Rolling friction is thus reduced to a minimum so that capacity loads can be moved without powered equipment of any kind.

Weighing only 12½ lb, this versatile dolly can be used in sets of 2, 3, or 4 to fit the load, and is available in straight motion or swivel type models.

More information? Circle Item 46, postcard, last page.

Water Pulls Air Through Tower

Air movement and cooling are accomplished by a system of water-jet nozzles at the top of its Jet Action cooling tower, according to its manufacturer, Koch Engineering Co., Wichita, Kan.



Nozzles spraying downward, perform two functions: the downward jet of water causes movement of a large volume of air through the tower somewhat similar to the draft felt in a shower when the water spray is wide open. The spray nozzles atomize the water into minute particles, causing a better mixing of air and water for high cooling efficiency. This atomizing process eliminates wood slats and the baffles used in most conventional towers, as well as fans, electric motors, belts, pulleys, and bearings.

The cooling tower may be installed in any outdoor location, since it does not depend on the wind, nor is it affected by wind direction or velocity.

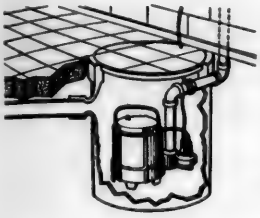
More information? Circle Item 47, postcard, last page.

(Continued on page 137)

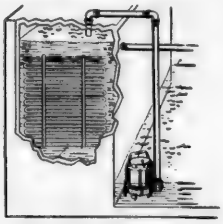
A few of "101" uses for

KENCO
SUBMERSIBLE PUMPS

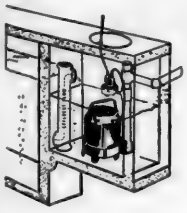
Yes, there are hundreds of applications for Kenco Submersible Pumps! With their amazing capacity—compactness—low center of gravity—portability and *submersible* features, you'll discover new applications—new and better installations never before possible! Here are a few:



Basement Sump Pumps — for a neat, clean, under-the-floor installation. Don't short out — they're designed for complete emersion in liquids. Ideal for dewatering utility pits, loading docks, low areas, elevator shafts, tunnels.



Air Conditioning Units—for water or coolant circulation in original air conditioning and cooling equipment; for removing condensate.



Septic Tanks — use as a disposal unit for septic tanks where the tile field or leaching bed is higher than the tank. Pumps effluent from tank uphill to disposal bed.

MODEL 140 SUBMERSIBLE PUMP

For automatic cycling or continuous duty. Pumps up to 2600 GPH at 5' head. Guaranteed self-priming — air-lock eliminator expels air! Built-in check valve. Dependable switch control — no electrodes, floats, etc. to foul or corrode. Perfect heat dissipation and lubrication.

Get all the facts on the complete line of Kenco Submersible Pumps with capacities up to 5000 GPH. See them at your Kenco Dealer, or write us.

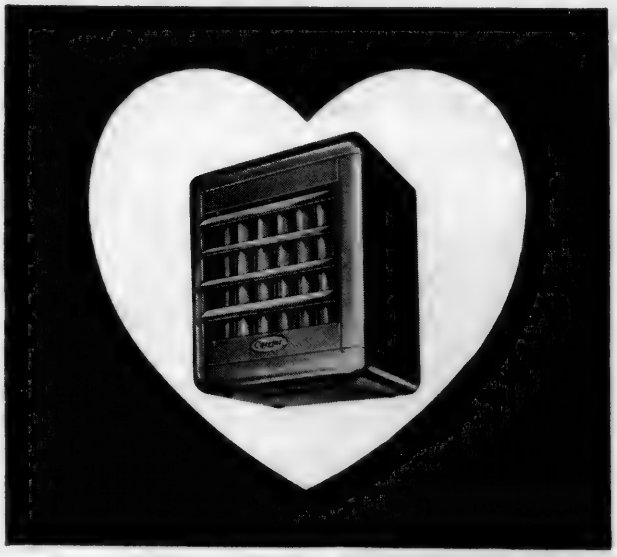
KENCO PUMP DIVISION
1305 Oberlin Avenue • Lorain, Ohio

A DIVISION OF • CO ILLINOIS THE AMERICAN CHROME PRODUCTS

Carrier Gas-Fired Heaters offer

TWO BIG ADVANTAGES

straight from the
"heart of aluminized steel"



long-lasting value plus smart design

First big advantage: Carrier Gas-Fired Unit Heaters and Duct Furnaces offer special long-lasting value. Only Carrier has this "heart"—an all-welded heat-exchanger made of 16-gauge aluminized steel. It far outlasts ordinary furnace steel of heavier gauge and ceramic coated metals.

Second big advantage: these Carrier Gas-Fired Unit Heaters and Duct Furnaces combine the smart design demanded for the most modern stores and offices . . . with the dependability and performance features that are required by industrial applications.

Along with these two advantages, there is also a wide choice—Unit Heaters in 8 sizes, 50,000 to 230,000 Btu/hr. Duct Furnaces in 7 sizes, 70,000 to 230,000 Btu/hr. Look in the Classified Directory under "Heaters—Unit" for the name of your Carrier wholesaler. Or drop a line to Carrier Corporation, Dept. UH, Syracuse, N. Y.

Carrier

industrial heating • air conditioning • refrigeration

KOCH

JET forced draft

COOLING TOWER

An amazingly efficient tower that combines the simplicity of natural draft towers with all the efficiency of a forced draft tower.

* no moving parts!
* installs easily...anywhere!
* compact...attractive!
* COST LESS!

Available sizes match all self-contained air conditioners 3 to 25 tons

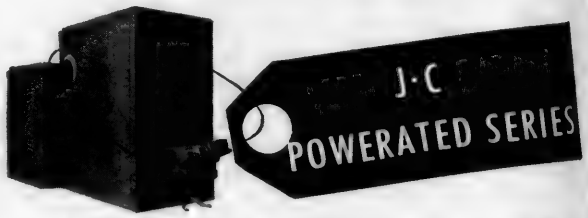
The same engineering skill that has made Koch products outstanding in the [illegible] industry [illegible] has gone into the manufacturing of this revolutionary new Koch Jet Action Cooling Tower.

A few areas are open for Manufacturer's Representatives. Right now . . . write for information.

KOCH
ENGINEERING CO.
321 West Douglas
Wichita, Kansas

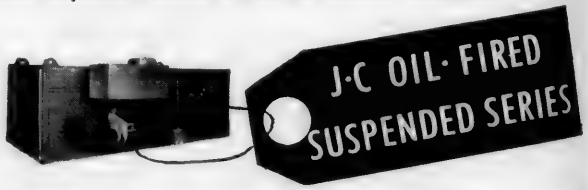
JACKSON & CHURCH FURNACES

HANDLE DIFFICULT HEATING JOBS



Jackson & Church engineering has produced a new Powerated furnace line which matches today's heaviest duty requirements. These new furnaces develop static pressures up to 1½" W. C. with lock-seam, leakproof casings designed to carry the heaviest air load ever the unit for air conditioning. Oil, gas or dual-fuel firing with outputs from 152,000 to 3,800,000 Btu. The J-C Powerated Series incorporates the latest advances in modern industrial and commercial heating.

Available for heating plants, stores, churches, schools and other large structures, these new gas-fired models have inputs of 200,000 to 400,000 Btu, with some units approved either as horizontal furnaces or as blower type heaters. These J-C units provide the convenience of gas firing plus all the advantages of suspended type heating such as savings in floor space and almost limitless zone heating possibilities. Drawer type burners for easy accessability, easy installation. J-C gas-fired suspended furnaces are built for minimum maintenance.



Space-saving oil-fired suspended models, available in a wide range of sizes with outputs of 89,000 up to 1,000,000 Btu, these easily installed units are most versatile in application. They can be installed singly or in batteries, and can supplement other heating for plant expansion and they are readily adapted to year round air conditioning. These dependable units solve many commercial and industrial heating problems.

With outputs from 400,000 to 2,000,000 Btc, and available for oil, gas or dual-firing, J-C Direct-Fired units are ideally adapted for large commercial or industrial heating jobs. They may be installed on the floor, or suspended either inverted or horizontally. They are self contained, automatically controlled units equipped with induced draft fan and air circulating blowers. J-C Direct-Fired Unit design makes savings possible in both installation and maintenance costs.

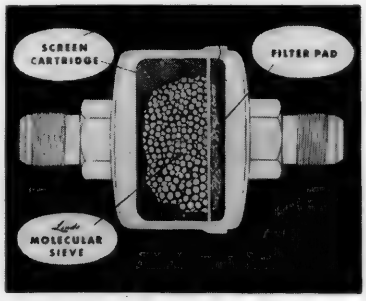
J-C

JACKSON & CHURCH — FURNACE DIVISION
Saginaw, Michigan

(Continued from page 134)

Small, Efficient Filter-Driers

A new line of TMC filter-driers with up to nineteen times the capacity in one-tenth the space is announced by the Tube Manifold Corp., North Tonawanda, N. Y. The improved performance and small size of these filter-driers has been made possible by the use of Linde Molecular Sieves as the desiccant. Only four sizes are required to handle installations ranging from ¼ to 15 tons, due to their high efficiency.



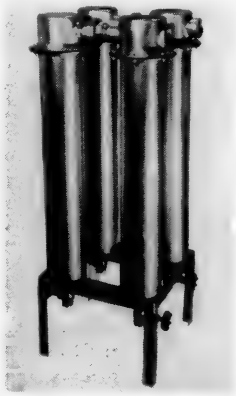
Separation of liquids is based on a principle utilizing the difference between the molecular size of water, refrigerant and oil. Space and weight savings greatly simplify system layout for the design engineer. Engineering is simplified. Ordering, inventory, stock control and investment are reduced to a minimum due to the ability of four models to handle a wide range of capacities.

An important advantage of the filter-driers is their ability to function at peak performance when system is operating at elevated temperatures encountered in hot climates and under heavy duty operation. The presence of oil in the refrigerant has no effect on their drying efficiency.

More information? Circle Item 48, postcard, last page.

Waterless Aftercooler

Airlenco, Inc., Elyria, Ohio, announces the addition to its line of a waterless aftercooler, for removing oil and water from compressed air lines. The unit consists of four of the company's standard air filters, connected in series and mounted so as to occupy a floor space of only 18 inches square. The filter is a 36-inch cylinder, 6 inches in dia, in which is mounted a smaller cylinder having a perforated bottom and filled with Fiberglas. Compressed air enters at the top, flows downward, then up through the Fiberglas, which acts as a series of baffles.



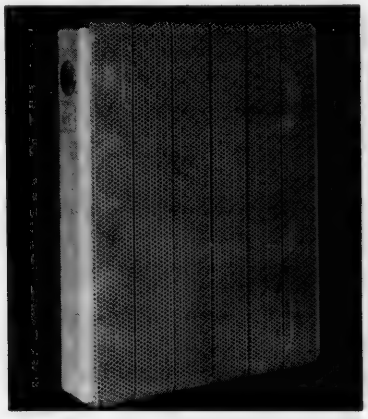
The filters in series act effectively as condensers. In addition to removing oil from the lines, they condense the water vapor present into entrained moisture and remove it from the lines. Four of these filters in series accomplish a much more rapid heat transfer and condensation of water vapor than occurs in a run of several hundred feet of relatively thick-walled 2-inch pipe. The primary advantage is the elimination of the need for using water as a cooling agent, making the cost of the operation negligible as compared with the expense of using a substantial flow of water.

More information? Circle Item 49, postcard, last page.

Institutional Radiator

A standard line of steam and hot water radiators, specifically designed for use in mental and correctional institutions, is manufactured by Shaw-Perkins Mfg. Co., Pittsburgh, Pa.

Known as the Shaw Model I, the line features a box type housing of heavy, closely-perforated steel which



completely covers the interior construction. Tampering and insertion of foreign matter is thus prevented, and thorough cleaning is accomplished simply by hosing down. Entire assembly, housing, heating fins, and copper tubing, is permanently bonded together to form a one-piece unit that field tests show is indestructible in institution service. Further safety features include rounded corners overall, and structural design that keeps exposed surfaces of the radiator at temperatures safe to the touch.

More information? Circle Item 50, postcard, last page.

6 Models in Refreshment Series

The coffee-break business has been entered by Air Conditioning Div., General Electric Co., Bloomfield, N. J., by the introduction of six new models of a refreshment series that offer liquid foods and hot beverages. The company is making the new models available along with its regular water cooler line for 1957.

Designed to help the employer save important coffee-break time during the day, the new models will feature hot and cold water taps plus an optional small executive type refrigerated compartment for storing cold beverages.

The refreshment series, including bottle and pressure types, is ideally suited for dispensing packaged servings of coffee, cocoa, tea, soup and other grocery items.

More information? Circle Item 51, postcard, last page.

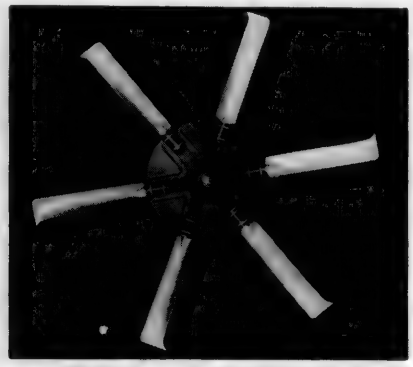
(Continued on page 138)

(Continued from page 137)

Propeller for Cooling Towers

Improved large-diameter Al-metal propellers for cooling towers and heat exchangers are offered by Large Propeller Div., Aerovent Fan Co., Inc., Piqua, Ohio.

Developed originally for the petroleum industry and allied fields, these units are a modification of the Macheta



airfoil propeller. Cast-aluminum blades, engineered to move maximum volumes of air with minimum power consumption, are individually balanced to permit full interchangeability in any assembly, and to speed and simplify installation and maintenance, company states.

Heavy-duty cast steel hubs, with bolted blade sockets for easier erection, assure maximum resistance to vibration and stress. Blade root is designed to fit snugly into socket, with a peripheral key engaging keyway in socket for extreme centrifugal strength.

Endurance tests were conducted at 3 times normal loading.

Available with 4 to 6 blades, in diameters from 14 to 18 ft, these units offer single or multiple-pitch operation.

More information? Circle Item 52, postcard, last page.

Control Motors

A new electric motor designed to operate rotary, slip-stem, and butterfly valves, dampers, and other final elements in automatic control systems has been introduced by Industrial Div., Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.

Motor, a reversing capacitor type known as the Actionator, is manufactured in two basic models. One unit, M 630, is designed for two-position and floating control; the other, M 930, for proportioning control.

The new motor units are compact, approximately 6 inches in diameter and 10 inches wide, and weigh 11 lb. They incorporate a gear train that permits a selection of timings from 7.5 to 120 sec, depending on model. Proportioning control models permit very positive positioning, making accurate proportioning control possible. For example, with a motor of 30-sec timing, there are 90 positions of 1.8 deg each.

To prevent "coasting" in any of the positions, the units have a built-in internal brake capable of holding a dead-weight load up to 200 lb. Limit switches, which can be adjusted easily in the field, vary the travel from 10 to 350 deg for one model, and from 10 to 160 deg for the other model.

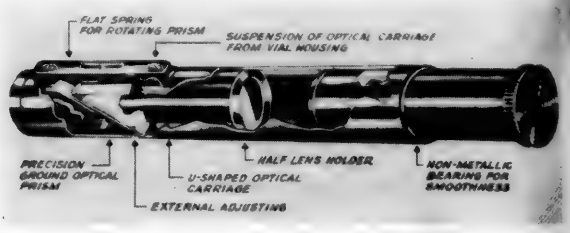
Enclosed terminal compartments in both units can accommodate up to 16 terminals. These facilitate retransmission, operation of a second motor or the remote indication of control element positions.

Motors are designed to operate under temperature conditions ranging from 25 to 150 deg F. Electrical ratings are 115 or 208 volts at 60 cycles and 230 volts at either 50 or 60 cycles. They both draw 25 watts.

More information? Circle Item 53, postcard, last page.

Level Adjusts from Without

A Locke-type hand level with cross hair engraved on an optical glass index prism adjustable without dismantling the instrument is produced by Stratex Instrument Co., Los Angeles, Calif. Called Silver City, the level can be adjusted from the outside with an ordinary penknife.


FLAT SPRING FOR ROTATING PRISM
SUSPENSION OF OPTICAL CARRIAGE FROM VIAL HOUSING
PRECISION GROUND OPTICAL PRISM
U-SHAPED OPTICAL CARRIAGE
HALF LENS HOLDER
NON-METALLIC BEARING FOR SMOOTHNESS
EXTERNAL ADJUSTING

Non-metallic eyepiece tube bearing, aluminum body, and non-flaking jet synthetic corundum finish are featured. The instrument is recommended for simple leveling, grade and profile measurement, earth work and forest mensuration, irrigation, stratigraphic measurements, and for similar chores in all branches of field engineering.

More information? Circle Item 54, postcard, last page.

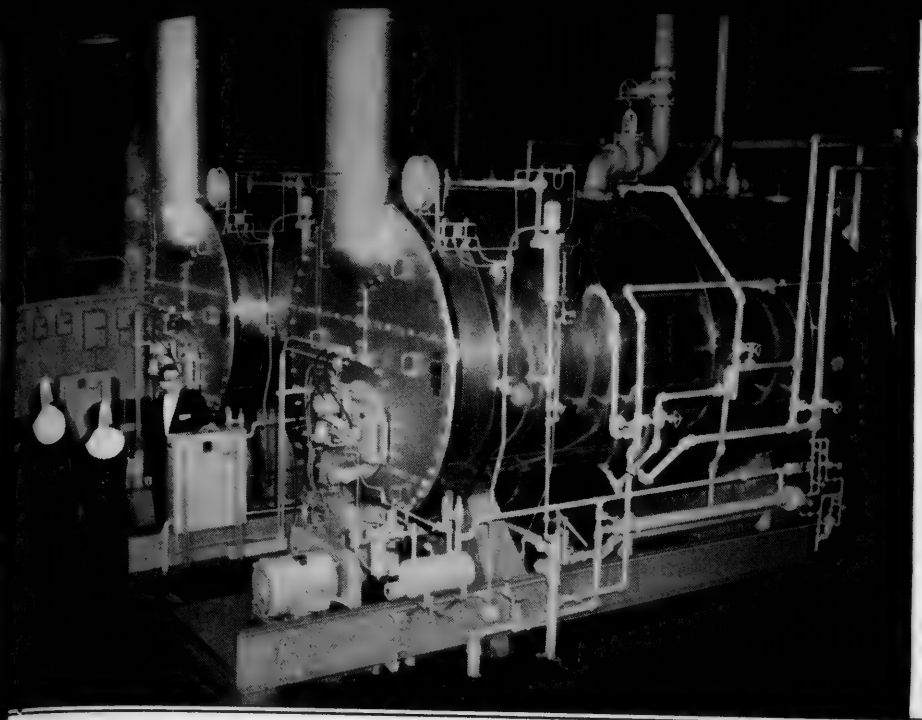
Makes Masonry Saw Portable

Wheel-A-Bout, an accessory, provides instant mobility for the 2-h.p. Supermatic masonry saw manufactured by Clipper Mfg. Co., Kansas City, Mo.

Wheels are quickly atttached, then retract or lower in seconds. Stow-Away handles recess when not in use. One man moves the saw easily, quickly, anywhere around the job or in the plant, the company says.

More information? Circle Item 55, postcard, last page.

(Continued on page 140)



NEW BOILERS combine efficiency and handsome appearance. Edward S. Green, Edgemont (Pa.), contractor, was responsible for this superior installation. Pictured left to right are: Sister M. Cor Immaculatum, Immaculata College Treasurer, Sister Jean Marie, Community Treasurer, Reverend Mother Maria Alma, Superior General and Salvatore S. Guzzardi, Consulting Engineer.

OLD BOILER was a coal-fired HRT model — typical of many replaced by modern Cleaver-Brooks oil, gas or combination oil/gas fired boilers.

Consulting engineer* tells how Immaculata College boiler modernization saves estimated $12,000 each year

Salvatore S. Guzzardi CONSULTING ENGINEER
2928 LEWIS TOWER · PHILADELPHIA 2, PA · KINGSLEY 6-2777

December 20, 1956

Mr. John C. Cleaver, President
Cleaver-Brooks Company

Dear Mr. Cleaver:

Recently our office was retained to make an impartial, exhaustive engineering study of the 40-year old boiler plant and steam system at Immaculata College, Immaculata, Pa., which is staffed by the Catholic order, Sisters of the Immaculate Heart of Mary.

As a result of our recommendations, two fully automatic, oil-fired, 350 bhp Cleaver-Brooks package steam boilers, (12,000 lbs/hr steam each), replaced three hand-fired coal boilers and steam-driven auxiliaries. The new boilers are operating at approximately 80% boiler efficiency year-round.

Conversion of coal firing to automatic #6 oil firing and increased boiler efficiency has reduced the fuel cost approximately 50% -- amounting to a saving of $12,000 each year.

The Cleaver-Brooks boilers burn #6 oil and operate automatically at 80 pounds steam pressure 'round the clock -- without the presence of operators in the boiler room. Eliminating boiler plant labor saves the College $7,500 each year.

The cost of the boiler plant modernization will be paid for out of fuel and labor savings in approximately 2-1/2 years.

Commendation for this outstanding performance of the Immaculata boiler plant is due to your well-engineered boiler design and to the cooperation of your skilled servicemen. The results achieved were so impressive that the Sisters subsequently modernized their Villa Maria Convent, Westchester, Pa., with two 100-bhp Cleaver-Brooks boilers.

Sincerely yours,

Salvatore S Guzzardi

*Salvatore S. Guzzardi — Award-winning head of an organization of experienced professional engineers specializing in modernizing power service facilities. Clients include: Pennsylvania University, Baldwin-Lima-Hamilton Corp., H. Daroff & Sons, Sun Shipbuilding & Dry Dock Co. and City of Philadelphia.

Surveys show 32% of boilers now in service are 30 years old; 56% are over 20 years old

If your boiler fits this description, we recommend an immediate survey. "In 90% of the plants surveyed," summarizes Mr. Guzzardi, "we have found it possible to save thousands of dollars and to pay for the recommended improvements out of annual savings within one to three years."

Again and again the proved economy of Cleaver-Brooks four-pass, forced-draft boiler design results in savings reports as impressive as this. Contact your nearest Cleaver-Brooks representative for more facts on the complete line of steam and hot water boilers—19 sizes, 130 models, 15 to 600 hp—for heating or processing. Or write Cleaver-Brooks Company, Dept. G, 315 E. Keefe Ave., Milwaukee 12, Wis., U.S.A. Cable Address: CLEBRO—Milwaukee—all codes.

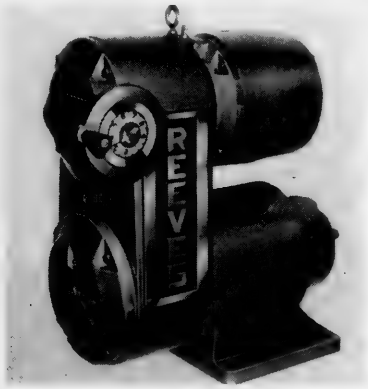
Cleaver Brooks

ORIGINATORS OF SELF-CONTAINED BOILERS

(Continued from page 138)

Variable-Speed Motor Drives

The new Reeves Vari-Speed Motodrives, manufactured by Reliance Electric and Engineering Co., Cleveland, Ohio, have improved operating efficiency and extended ratios of speed variation. Each size is available in stand-



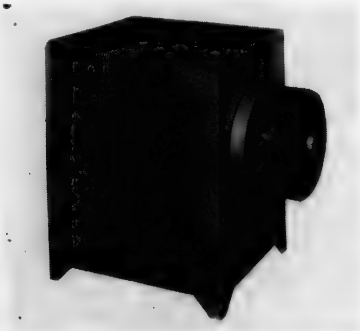
ard assemblies tailored to fit a wide range of space requirements. In addition, many motor and mounting modifications, as well as remote control features, are available for unusual installation requirements.

Crisp modern lines and compact design are now available in integral horsepower ratings up to 5 hp. The machine provides a versatile tool for any industry, especially when used with automatic control systems and such available accessories as magnetic brakes and tachometers.

More information? Circle Item 56, postcard, last page.

Cooling Tower Design Change

A simple design change has far-reaching effects in the latest version of the Summer Shower cooling tower made by Silvercraft, Inc., Louisville, Ky. New models have the electric motor mounted behind the fan at the very end of the cooling cycle, rather than between the fan and the wet deck cartridge as it was formerly. The advantages of this change, the company claims, are quieter



operation, greater cooling efficiency and increased ease of maintenance.

The quiet operation results from firm mounting of the motor to the fan guard instead of the body. In this position the motor is also more accessible for lubrication and maintenance. The biggest advantage of this new design, however, lies in its higher cooling capacity. Since the motor is no longer in front of the fan blades, it cannot interfere with the air draft. The increase of cooling power has raised the maximum capacities of cooling towers so the company now furnishes units up to 40 tons cooling capacity.

More information? Circle Item 57, postcard, last page.

Temperature-Pressure Relief

Expanding its Series 60 pressure, and combination temperature-pressure relief valves, The Patrol Valve Co., Cleveland, Ohio, announces the addition of Model 60X-6.

Designed expressly to meet FHA requirements, as well as for those who prefer an extension tube valve, the fuse plug for Model 60X-6 is located at the end of a 6-inch dip tube to provide contact with the hottest water in a domestic water heater storage tank.

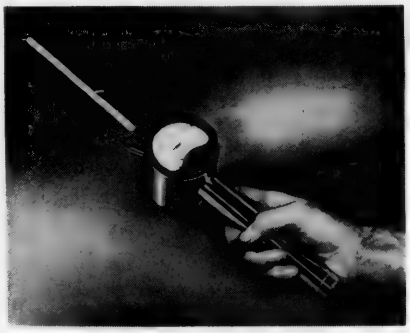
Valve has ½-inch NPT male inlet and female drain outlet connections. Standard factory settings are 125 psi pressure and 210 deg F temperature relief. Pressure range is 50 to 200 psig, and rating is 150,000 Btu per hr. Two extra fuse plugs are packed with each valve.

More information? Circle Item 58, postcard, last page.

Surface Pyrometer

A low-cost surface pyrometer for the instantaneous taking of temperatures of all types of surfaces is offered by Pacific Transducer Corp., Los Angeles, Calif. It will check surfaces as small as ¼ inch, and its order of accuracy is 2% over the entire scale.

Instrument, which is finely balanced for constant hand use, is chrome plated throughout, providing an external reflective surface that prevents the absorption of heat



that would normally change the cold junction temperature. A calibrating thermometer, which is built into the unit, is positioned in the immediate vicinity of the cold junction, thereby proivding a more accurate means of cold junction calibration.

Pyrometer comes in three ranges. Model 321SL-IC is 50 to 650 deg F (10 to 340 deg C); Model 321S-IC has a range of from 0 to 1600 deg F (—20 to +880 deg C), and Model 321S-CA ranges from 0 to 2300 deg F (—40 to +1260 deg C).

More information? Circle Item 59, postcard, last page.

(Continued on page 142)

Bethcon: not too soft, not too stiff

Next time you get a piece of galvanized sheet in your hands, flex it back and forth a few times to get the "feel" of it. If that piece of steel just happens to be Bethcon, we'll bet it feels just right. Not limp and lifeless, not stiff as a board, but full of life and workability.

Translate that into terms of shopwork and finished product. It means that Bethcon will form up readily on your brakes and lock-formers. And it also means that the completed ductwork will be strong and rigid, ready for many long years of trouble-free service.

There is, of course, a very sound reason for Bethcon's ideal qualities. Our continuous galvanizing lines at Sparrows Point, Maryland, are of the very latest design, and include a continuous annealing process which gives the sheet just the right blending of strength and ductility.

Continuous galvanizing also bonds the zinc to the base metal much more tightly than conventional methods; so tightly, in fact, that the coating will not flake off even when the sheet is bent back on itself. It also does away with the old familiar bead on the drip end of the sheet.

You can order Bethcon sheets in cut lengths or coils, 13-ga and lighter, in either plain open hearth or copper-bearing (Beth-Cu-Loy) steel for the base metal, depending on your requirements. For further information, just get in touch with the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

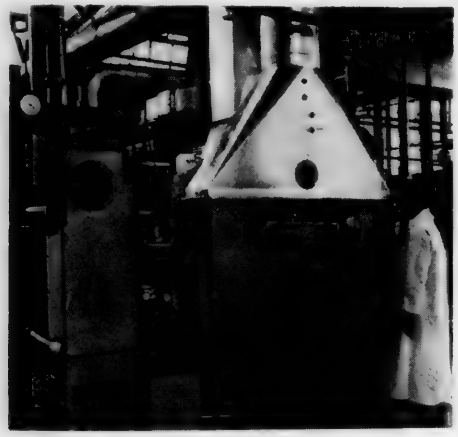
BETHLEHEM STEEL

BETHLEHEM STEEL

(Continued from page 140)

Humidity Control Unit

A newly-designed series of Model C Kathabar units for accurate and selective control of humidity applications is announced by Air Conditioning and Drying Div., Surface Combustion Corp., Toledo, Ohio.



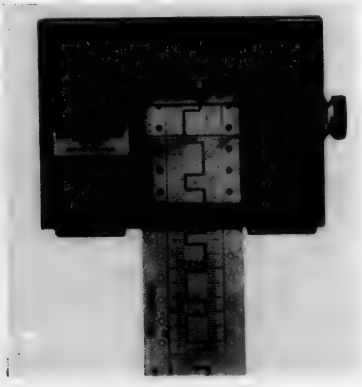
Corrosion problems, formerly associated with conventional equipment, have been eliminated by use of nickel construction on the regenerator, the company stated.

Porthole glass inspection doors provide internal visibility, and permit quick access to sumps, eliminator chambers, and fan chambers. Filter surface is increased and filter component is so designed that it can be conveniently removed for minor maintenance.

More information? Circle Item 60, postcard, last page.

Recording, Totalling Meter

A compact precision instrument for accumulating vital data on the operation of machines, processes, or systems, is announced by Standard Instrument Corp., Division of Heat-Timer Corp., New York, N. Y. Called the Model SR Recorder-Totalizer, it records, by means of strip chart and stylus, and registers on a counting device accumulated *on* or productive time. The instrument can



be provided with an operations counter instead of, or in addition to the time totalling device.

Not only has this instrument been applied successfully to manufacturing industries, but it has great potential as a portable tool for field engineers, service men, and consulting firms. It eliminates the necessity of constant observation, and can be applied to such operating equipment as refrigeration and air conditioning installations as well as heating plants, pumping stations, and power plants that are unmanned and only visited periodically.

More information? Circle Item 61, postcard, last page.

Data File Added to Racks

A data file has been added to its line of vertical filing equipment produced by Plan Hold, Corp., South Gate, Calif. Units so equipped include wall racks, rolling stands, carousel units, and filing cabinets.

There is also a standard holder which may be used with "home made" racks.

The company's friction type binders eliminate holes and other mutilations in the material to be filed.

More information? Circle Item 62, postcard, last page.

Small-Size Air Drier

Model A09A dehumidifier, delivering 150 cfm of dry air, is the smallest capacity unit added to its line by Bryant Mfg. Co., Indianapolis, Ind. It has no cycling valves, cycling towers, or timers.

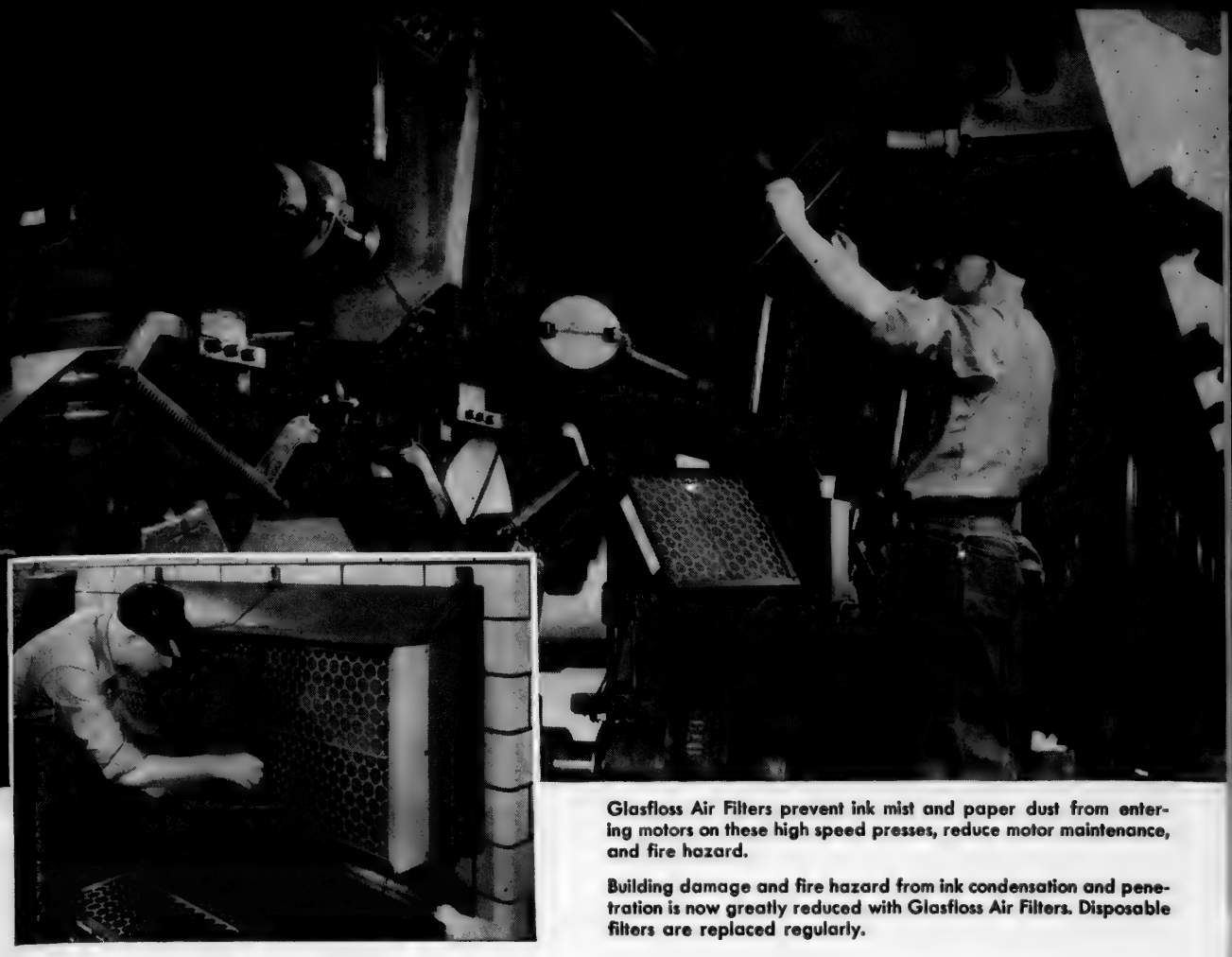
Multiple installation of the 17 inch high unit makes it applicable to any size job, the company says. It is expected to be used in food and chemical processing plants as well as laboratories where vapor or frosting is a problem.

Electric current required is a 230-volt 3-wire power supply, with straight 115-volt optional for domestic use. Ductwork in the case of an inside installation is a simple exhaust vent. For an outside installation, discharge and return ducts would be needed.

Removal of moisture in the new unit is by physical absorption. A constantly revolving drum of silica gel desiccant draws moisture from the air. While one area of the desiccant adsorbs moisture, another area is being heated to drive the unwanted moisture out—reactivating the desiccant for continued use. Heat is obtained from a tubular resistance heater. A humidistat controls the amount of moisture pulled from the air.

More information? Circle Item 63, postcard, last page.

(Continued on page 144)



Glasfloss Air Filters prevent ink mist and paper dust from entering motors on these high speed presses, reduce motor maintenance, and fire hazard.

Building damage and fire hazard from ink condensation and penetration is now greatly reduced with Glasfloss Air Filters. Disposable filters are replaced regularly.

Glasfloss* Air Filters lessen press maintenance, reduce ink mist hazard at Rochester Times Union

The Rochester Times Union, Rochester, N.Y., had two serious problems common to most newspaper plants, according to Mr. Arnold J. Cunningham, the newspaper's building superintendent.

1. Ink mist and paper dust from 15 press-unit drive motor intakes required the cleaning of internal motor parts every three months. This caused production delays, and thorough cleaning was not always possible.
   Solution: Glasfloss Fiber Glass Air Filters were installed on special frames. Now motor cleaning is done only once every six to eight months, and less time is required. Light vacuuming of filter faces daily allows maximum air intake. Motor operating temperatures are lower and a fire hazard is reduced.
2. Ink condensing inside the air ducts created an extreme fire hazard and ink-spot damage to ceilings and equipment. Paper dust caused extreme surface loading and this impeded the passage of ink mist through the filter.
   Solution: After extensive testing of many filtering devices, Glasfloss Filters proved to be the most satisfactory. Through regular rotation and replacement of filters, the fire hazard has been greatly reduced. Building damage from ink condensation and penetration is very slight. Filtering costs are at a minimum.

*Trademark

GLASFLOSS AIR FILTERS CAN HELP YOU, TOO!

Pittsburgh Glasfloss Air Filters are made from fine, soft fiber glass which provides a greater, more efficient dirt-and-dust-collecting area. Glasfloss Filters are soft and easy to handle; this fiber glass will not splinter or pierce the skin.

Get top results with Glasfloss Air Filters. Write for the name of your nearest Glasfloss distributor. *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.*

GLASFLOSS FILTERS ARE A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh and St. Louis

FIBER GLASS

PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS

PITTSBURGH PLATE GLASS COMPANY

(Continued from page 142)

Oil Bath Air Cleaner

Type P and P-V Sycoil oil bath air cleaners for smooth flow application are introduced by American Air Filter Co., Louisville, Ky. They are low-resistance high efficiency cleaners, offered with a redesigned base for less expensive installation, improved protection at the air intake against snow and water, greater bug protection, and redesigned variable-flow valves.

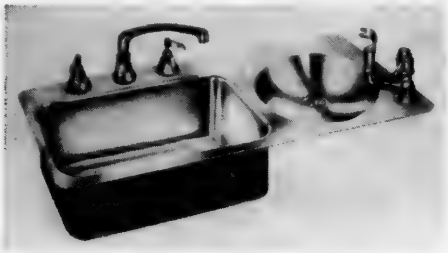
Thorough mixing of oil with intake air and positive draining from filter pads insure that 100% of the damaging dust is removed. These, and perforated entrainment plates provide dust protection for super-charged engines and centrifugal compressors.

Type P answers the need for a highly effective air cleaner on engines with low allowable intake resistance. Type P-V is identical except that variable-flow valves have been added on the entrainment plate to insure top efficiency and cleaning action regardless of percentage of rates capacity at which the engine is operating.

More information? Circle Item 64, postcard, last page.

Two-Bowl Sink Combination

A stainless steel sink and drinking fountain combination featuring two bowls is the latest addition to the Lustertone line for school and institutional use by Elkay Mfg. Co., Chicago, Ill. The unit has special appeal for new school construction, since it can be installed right in the classroom to offer double convenience for clean-up and drinking fountain service.

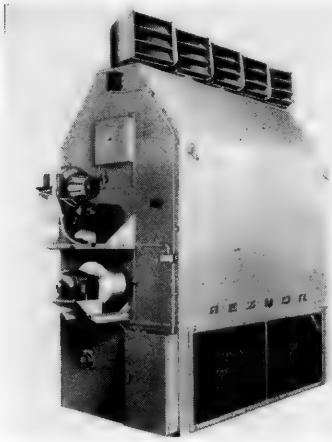


Manufactured to the company's highest custom fabrication and workmanship standards, yet reasonably priced because it combines standardized bowl components, the newly designed sink combination is available in four models. Overall sizes in inches are 32 x 17, 34 x 16, 35 x 17 and 37 x 14. Two models offer an over drinking fountain bowl combined with a large rectangular bowl sized 16 x 11½ inches. One model has a 12-inch dia round bowl. All four combination units are available in models offering the bubbler on right or left hand side and have been designed in conformity with plumbing codes requiring separate compartments for washing and drinking.

More information? Circle Item 65, postcard, last page.

Direct-Fired Space Heaters

A series of large stainless steel direct-fired space heaters, with individual unit capacities from 400,000 to 2,000,000 Btu per hr, has been added to the line of commercial and industrial heating equipment manufactured by the Reznor Manufacturing Co., Mercer, Pa. The new units may be equipped with gas, oil or dual fuel burners



and operate efficiently with fuel oils, through No. 5 grade, or natural, mixed, manufactured or LP gas. Combination gas and oil units can be supplied with interchangeable burners or with a single burner that can be adapted for the second fuel by merely flicking a switch.

These heaters can be installed for top, bottom or horizontal discharge and are easily adapted for use in duct systems. When installed without ducts, multiple individually-adjustable discharge nozzles with adjustable horizontal louvers allow precise control of the air distribution pattern.

Other features include a floating stainless steel heat exchanger which eliminates the possibility of damage due to contraction and expansion, and 4-pass design which produces high efficiency in heat transfer.

More information? Circle Item 66, postcard, last page.

Multizone Air Handlers

Model 580 multizone air handling units with capacities of 35,000 cfm and 58 sq ft of coil face area, covering the cooling range up to 100 tons, are available from Recold Corp., Los Angeles, Calif.

Three styles are offered: vertical draw through, horizontal draw through, and a blow-through unit with individual zones. The latter has either horizontal or vertical damper discharge and may handle up to 14 zones.

More information? Circle Item 67, postcard, last page.

(Continued on page 146)

There's MORE from Allis-Chalmers MOTOR distributors

Complete Motor Line

. . . plus quality and service

As part of a national network of more than 200 franchised outlets, your nearby Allis-Chalmers Motor Distributor offers the rare combination of *fast service* and a *complete line* of *fine-performance* integral horsepower motors. He's the right man to give you just the right motor — in a hurry.

It adds up to:

1. Simplified Buying — Here's one source for all motors from 1 to 200 hp, as close as your telephone. Single source trims clerical costs, minimizes purchasing and accounting expenditures.

2. Reduced Inventory — You don't have to tie up funds and warehouse space with spare motors and replacement parts. The A-C Distributor is your motor storehouse.

3. Continuous Production — Your A-C Distributor can deliver a motor to your shop in a matter of hours. (And, once you order an A-C motor, you're sure of 'round-the-calendar operation.)

GET ACQUAINTED with your Allis-Chalmers Motor Distributor soon. You can find out his name by contacting the A-C sales office in your area, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

multi-speed
synchronous
wound-rotor
vertical hollow shaft
face mounted
drip-proof
open
foot mounted
dc series wound
splash-proof
squirrel-cage
"Synduction"
dc shunt wound
vertical solid shaft
explosion-proof
totally enclosed
dc compound wound
flange mounted
gear motors

Synduction is an Allis-Chalmers trademark.

ALLIS-CHALMERS

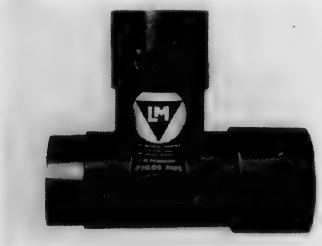
A-C ALLIS-CHALMERS

A-5187

(Continued from page 144)

Bituminized Fiber Fittings

New Permaline wye and tee fittings are now available from Line Material Industries, McGraw-Edison Co., Milwaukee, Wis., for use with four-inch bituminized fiber pipe. These products, made of bituminized fiber material, augment the line of cast iron and lightweight composition fittings offered by the company.



Pipe and fittings resist absorption of water and chemicals, such as organic acids, alkalis, inorganic salts, organic materials and wastes. Root-proof fittings, with carefully machined tapers, have smooth inner surfaces that allow high flow capacity.

Economies of time and labor through ease of handling and rapid installation are paramount advantages. Leak-proof seals developed between pipe and fittings will withstand static pressure greatly exceeding specifications of Commercial Standards CS116-54.

More information? Circle Item 68, postcard, last page.

Liquid Chillers in 2 Series

Two series of packaged water chillers, with capacities from 1¾ through 5 hp, are introduced by Acme Industries, Inc., Jackson, Mich., under its Flow-Pac trademark. The compact, easy-to-install units, one series water cooled and the other air cooled (as illustrated), are designed for either air conditioning or industrial liquid cooling applications.

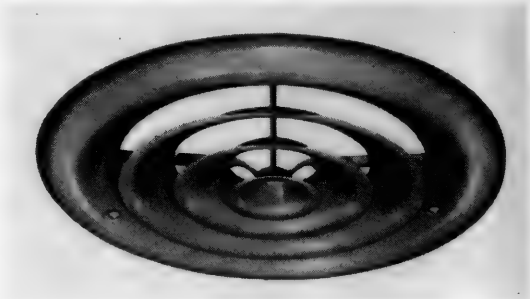
Both series have high and low pressure cut-out controls, freeze-up protection controls, water temperature controls, capillary refrigerant feeds, bellows for water regulating valves, and compressor contactors with two sets of auxiliary contactors for pump and cooling tower operation.

Because of the units' compactness, multiple-unit installations are possible in situations where more than a 5-ton capacity is required. Any of the chillers can be combined to supply the exact capacity needed. They can be connected in parallel or in series.

More information? Circle Item 69, postcard, last page.

Flush, Step-Down Diffusers

A wide ring ceiling diffuser is introduced by Air Control Products, Inc., Coopersville, Mich. Designated Model 76 on the flush style, and Model 77 in the step-down version, it consists of a series of wide, concentric rings in an



Air-foil design. Anti-smudge outer ring is designed to eliminate turbulence-caused smudging.

Both models are supplied in satin beige prime coat, are equipped with self-sealing gasket applied where the diffuser meets the duct.

Push-pull rod-operated damper with butterfly valve is designed for use with the diffusers, available in 6, 8, 10, 12, and 14-inch sizes.

More information? Circle Item 70, postcard, last page.

Air Conditioners Redesigned

A redesigned line of water-cooled packaged air conditioners for commercial and industrial use is announced by U.S. Air Conditioning Corp., Philadelphia, Pa. They can be quickly converted to air-cooled operation by use of a cut-off valve, standard on all units.

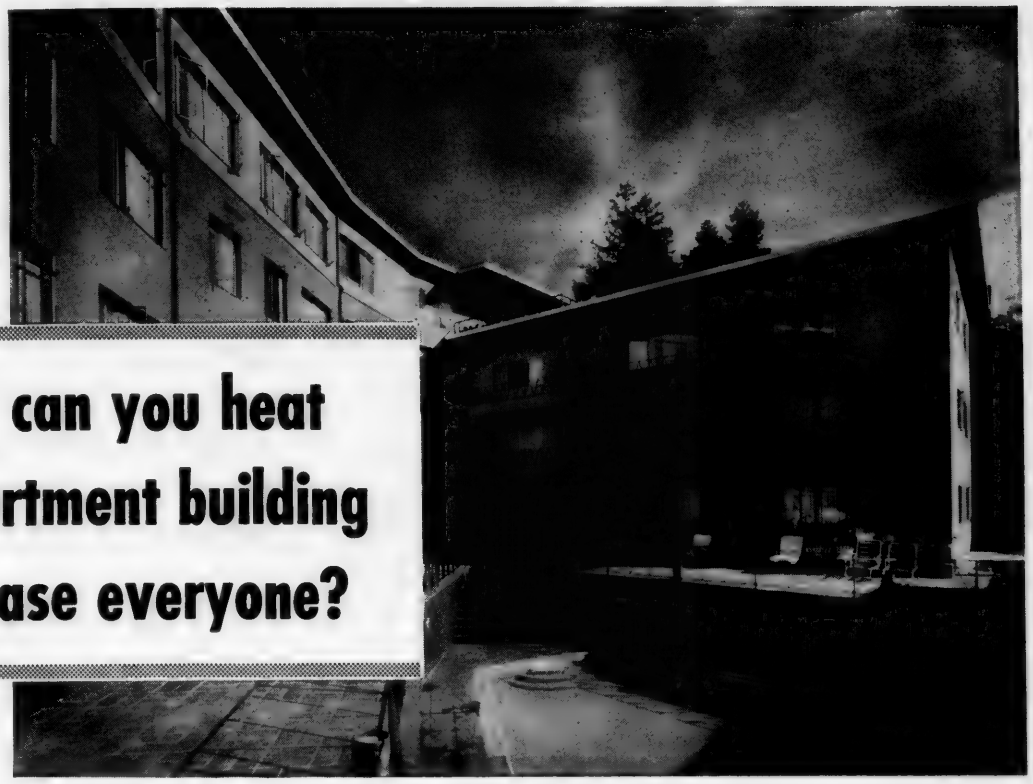
Included in the line are 3, 5, 7½ and 10-h.p. single circuit models, and dual circuit 15 and 20-h.p. models. The units are completely factory assembled and tested, requiring three connections: water, electric, and drain.

Waste space is eliminated in the arrangement of major components and the overall size of the package has been reduced. For example: Model 7730 when used for horizontal air discharge will fit into a space 65¼ inches high (actual height of unit less plenum).

Blower can be rotated in the field from standard vertical discharge to horizontal discharge through a removable panel in the rear of the unit, eliminating the 90-deg turn in the ducts from the blower outlet for horizontal discharge. Blower scroll is the only part rotated as motor and drive remain as supplied. This flexibility allows the conditioner to be used in more varying applications. The blower motor mounting is isolated from the rest of the unit by 1-inch rubber vibration mounts.

More information? Circle Item 71, postcard, last page.

(Continued on page 148)



How can you heat an apartment building to please everyone?

By letting each tenant select the temperature he likes in each room

IRON FIREMAN SelecTemp® HEATING

EVERY ROOM IS A SEPARATE HEATING ZONE with its own thermostat. Tenants can control the temperature according to their own preferences. The SelecTemp room heating unit automatically paces itself to supply just the right amount of heat needed. Unlike conventional "on-off" heating systems SelecTemp *modulates* from a slow "idling speed" up to full capacity. If one side of a building or home faces a cold wind while the other gets heat from the sun, the SelecTemp heating system automatically adjusts for this extra heat loss or gain *in each individual room.* In each SelecTemp unit the air is filtered, then heated by low pressure steam and circulated by a steam driven fan. There is no electric motor—both fans and thermostats are non-electric.

FOR ALL TYPES OF BUILDINGS AND HOMES Iron Fireman SelecTemp heating is ideal for any type of building or home, new or old. From the largest apartment, hotel, office or institutional building to the smallest residence, Iron Fireman SelecTemp system gives the same responsive and dependable service. It's a new, yet thoroughly proved method of heating that sets new standards of comfort and economy.

LOW INSTALLATION AND OPERATING COSTS. The installation of Iron Fireman SelecTemp in new or old construction is economical and practical. Installation costs are low. Overheating is eliminated and many owners report substantial savings in fuel bills.

FOR COOLING. Individual unit cooling with SelecTemp heating makes the perfect twosome for year 'round comfort.

Send for free literature. If you plan to build or modernize a building or a home, you owe it to your client and yourself to investigate Iron Fireman SelecTemp before deciding on any heating system. Don't miss the opportunity to learn about this great modern engineering advance in heating . . . Iron Fireman SelecTemp. Mail the coupon below.

SelecTemp room unit indicated by arrow.

Lee Street Apartments, Oakland, California.

"The installation presented an engineering problem," says Mr. Gordon Peterson, General Contractor, "as the boiler room is located at the extreme end of the building, a distance of 420 feet from the last SelecTemp unit. The system's flexible operation, its ability to heat only the occupied rooms, as well as its immediate response, is commended by our tenants. We feel that the SelecTemp heating system is the finest that has been devised for apartments" . . .

IRON FIREMAN.
Engineered
HEATING AND COOLING

MAIL COUPON FOR FREE INFORMATION

IRON FIREMAN MANUFACTURING CO.
3552 West 106th Street, Cleveland, Ohio.
(In Canada write to 80 Ward Street, Toronto)

- ☐ Send SelecTemp specifications and full information.
- ☐ Arrange for brief demonstration of SelecTemp room unit, in actual operation, in our office.

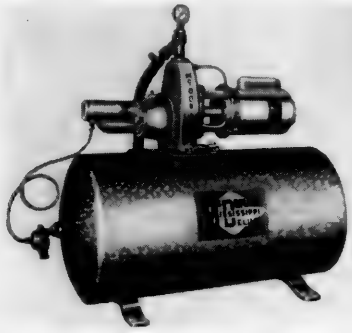
Name_____
Firm_____
Address_____
City_____ Zone____ State_____

(Continued from page 146)

Convertible Jet Pump Systems

A convertible jet pump, the Series 4200 Adapto-Jet, has been added to the line of the A. Y. McDonald Mfg. Co., Dubuque, Iowa.

This fully automatic system is available in three basic model series: the SW with capacities to 875 gph, maxi-



mum shut-off pressures of 59 psi; the L with capacities to 675 gph, maximum shut-off pressures of 75 psi; and the H with capacities to 408 gph, maximum shut-off pressures of 102 psi. The L and H models are converted from shallow to deep well service by removing the jet fitting assembly from the pump and installing it in the well. When converted for deep well service, the L models provide capacities to 813 gph at depths to 50 feet, and the H models provide capacities to 600 gph at depths to 80 feet. All three models are furnished in ⅓ and ½ hp sizes.

More information? Circle Item 72, postcard, last page.

Mirror Scales Cut Parallax

Indicating pyrometers made by Assembly Products, Inc., Chesterland, Ohio, may be read more accurately from all angles since they have been redesigned with mirror scales to cut down parallax effect, the company announced.

These medium resistance pyrometers (4 ohms per millivolt) are available in 21 standard ranges. Maximum sensitivity for a pyrometer connected to one thermocouple is 300 deg F for full scale deflection. Standard ranges begin with −400 to +100 deg and go up to 3000 deg.

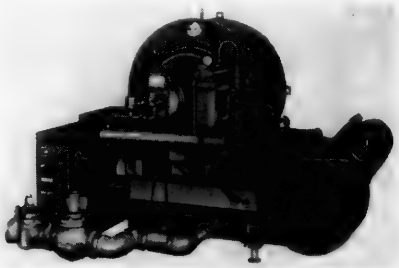
Full scale accuracy of 2% is standard, although 1% may be obtained at extra cost. These pyrometers may be thermistor-compensated to maintain accuracy in spite of ambient changes. They are furnished with compensation for changes in cold junction.

Styles available include panel mounted, portable and bench models. Meters are 3¾ and 4½ inches wide. White background with black lettering is standard, although black faces are available upon request.

More information? Circle Item 73, postcard, last page.

Forced Draft Packaged Burner

This forced draft packaged burner, produced by Ray Oil Burner Co., San Francisco, Calif., is a factory assembled unit designed specifically to be combined with any type boiler for forced draft operation to form an automatic packaged boiler-burner unit, for high or low pressure steam or hot water heating, with maximum rated capacities from 90 to 750 developed output horsepower.



Burner specifications may be selected to burn any grade of fuel oil from light No. 2 to heavy No. 6 or Bunker C, high or low pressure gas, or combination units burning either gas or oil.

The unit is compact and includes burner, belt-driven forced draft fan with speed adjustments, windbox with integral refractory, completely wired and enclosed control cabinet, and ignition and electronic safeguard system. All components are factory assembled, wired and piped ready for installation on boiler front. Only steam, water, electrical and fuel connections need to be made at job site.

More information? Circle Item 74, postcard, last page.

Low Side Units

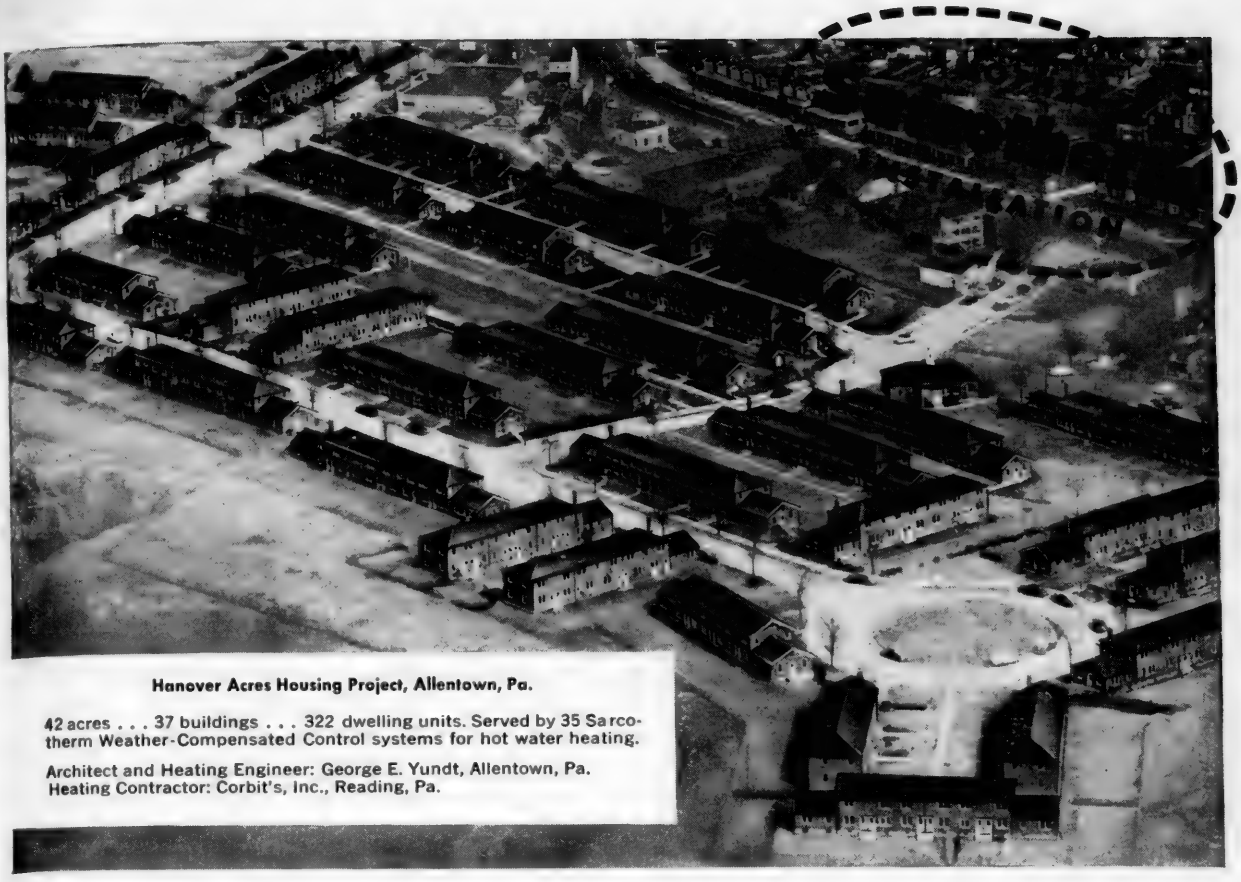
A line of low side units, designed for economic installation, is announced by Typhoon Air Conditioning Co., Brooklyn, N. Y., Div. of Hupp Corporation.

Built to accompany company's 2, 3, and 5-hp Thrifti-Kool TAR air cooled condensing units, the TEU and TEH low side units readily lend themselves to application in existing warm air systems.

A TAR air cooled condensing unit, plus a TEU upflow V-type evaporator coil, and a furnace blower, yield a year-round comfort system.

More information? Circle Item 75, postcard, last page.

(Continued on page 150)



Hanover Acres Housing Project, Allentown, Pa.

42 acres . . . 37 buildings . . . 322 dwelling units. Served by 35 Sarcotherm Weather-Compensated Control systems for hot water heating.

Architect and Heating Engineer: George E. Yundt, Allentown, Pa.
Heating Contractor: Corbit's, Inc., Reading, Pa.

42 acres of comfortable heating ...for 16 years!

Provided by 35 Sarcotherm Weather-Compensated Control Systems

Here's the Test...35 Sarcotherm Systems...16 years on the job...serving 322 dwelling units at Hanover Acres Housing Project, Allentown, Pa. That's a tough test of heating control dependability and economy!

And here's the Result!...The Housing Authority of the City of Allentown reports...throughout the entire 16 years these Sarcotherm Weather-Compensated Control Systems for hot water heating have given trouble-free service and provided money-saving, comfortable heating.

Dependability-plus...that's one of the major reasons Sarcotherm Systems have been installed in many important projects including Hanover Acres and Beardsley Terrace Housing, Bridgeport, Connecticut.

For undivided responsibility on your installations, specify and order from one "Complete Line" source...SARCO-SARCOTHERM.

Write for catalogs. Sarcotherm Controls, Inc., Empire State Building, New York 1, N. Y.

ADVANTAGES OF SARCOTHERM SYSTEMS

On-the-job help—Sarcotherm engineers cooperate in preparing working drawings and wiring diagrams for each job. Also assist in supervising the installation.

Easy to maintain—simple, trouble-free design, fewer parts.

Easy to adjust—to any desired setting.

Complete Control Systems from Sarcotherm include all accessories such as control panels, thermostats, radiator valves, balancing fittings, steam traps, domestic hot water controls, etc.

4008-B

Sarcotherm

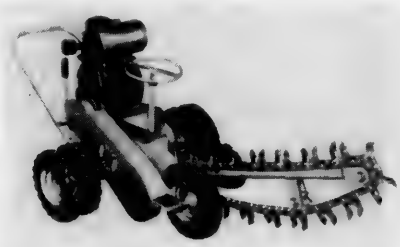
AN AFFILIATE OF SARCO CO., INC.

Weather-Compensated control systems for steam, hot water and radiant heating

(Continued from page 148)

Low Cost, Versatile Trencher

A low cost, versatile service line trencher, the Ditch-Witch Model M, is announced by the manufacturer, The Charles Machine Works Inc., Perry, Okla. The trencher is completely mobile with three forward digging speeds and reverse, plus road speeds up to 5 mph. In usual digging conditions, the model will trench at speeds of 1½ to 6fpm. It is also equipped with a trailer hitch for towing at speeds up to 25 mph.



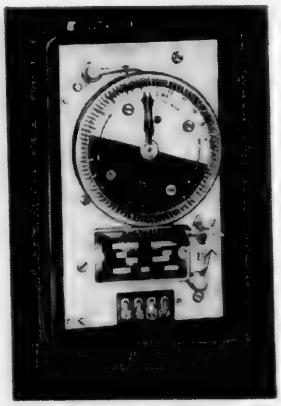
Trenching widths and depths available on this machine are 3 inches wide up to 48 inches deep, 4-inches wide up to 36 inches deep, and 6 inches wide up to 30 inches deep. Digging chains are quickly interchangeable on the job. All soils are deposited on one side of the trench, leaving the other side clear for access to the trench.

Powered by an 8-hp air-cooled engine and equipped with sealed ball bearings, the trencher weighs 500 lb.

More information? Circle Item 76, postcard, last page.

Time Switch

Control of intermittently operated equipment of all types is provided by a 24-hr time switch developed by Zenith Electric Co., Chicago, Ill. The switch will handle as many as 48 *on* and 48 *off* operations in one day. Typical operations on which it can be used include oil wells, heating and air conditioning equipment, stokers, oil and gas burners.



A control dial, scaled in 15-min graduations, is used to set up a daily operating schedule. Running periods are set by the sliding of self-contained, non-removable trip levers in or out on the dial. The switch will repeat the entire schedule automatically each day.

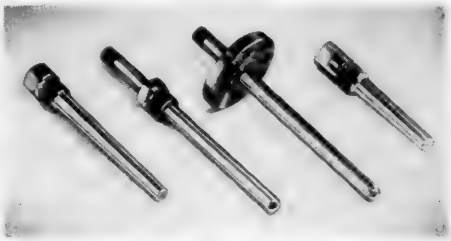
A calendar cutout device which will make the switch completely selective for all seven days of the week is available as an accessory. With this device, the switch makes provision for non-working days.

The mechanism is powered by a heavy duty, synchronous industrial motor, lubricated for life with low-temperature oil. Capacity is rated at 1000 watts, using 60-cycle a-c current. Action is single pole, double throw.

More information? Circle Item 77, postcard, last page.

Thermowell Line Has Variety

An expanded line of thermowells, both bar stock and built-up types, is offered by Thermo Electric Co., Inc., Saddle Brook, N. J. These units provide a means of protecting thermocouples against mechanical injury and corrosive or contaminating atmospheres.



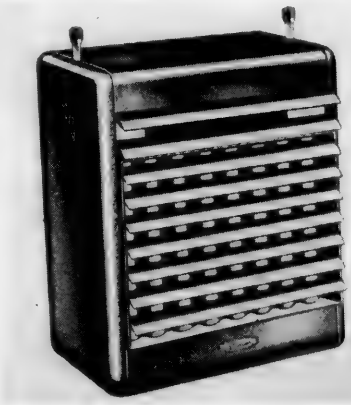
T-E thermowells are available in a wide variety to satisfy almost any temperature, environmental or installation requirements. Choice of a range of alloys provides individual thermowells to meet specific conditions of high temperature, oxidation or reduction, chemical corrosion, metallic amalgamation, mechanical shock or stress, and sudden temperature change.

Bar stock wells are drilled by rifle boring process with bore concentricity guaranteed within 10% of wall thickness. They are available flanged, and threaded with hex head or wrench flats, or with ground joints. Built-up wells of seamless pipe are available with threaded mounting bushings or flanges. Each thermowell is given an internal hydrostatic test as a final precaution against pressure failure.

More information? Circle Item 78, postcard, last page.

Suspended Unit Heaters

A line of gas fired suspended unit heaters is introduced by Pioneer Mfg. Co., Los Angeles, Calif. It includes fan, blower and duct types to answer all industrial and commercial needs including those where ceiling mounts are



indicated to avoid use of productive floor space and in large buildings for spot heating requirements. All units have automatic control.

For installations requiring heated air at higher static pressures, the line includes blower fan model.

More information? Circle Item 79, postcard, last page.

(Concluded on page 152)

Hide-a-way air conditioner is mounted above hallway

Building housing refrigerating system has cooling tower, with fans, on roof

Frick "ECLIPSE" compressors cooling 256 Woodlane Apartments

256 Luxury Apartments near Dallas Equipped with

TRADE FRICK MARK®

Air Conditioning

The Woodlane Apartments comprise 18 buildings, covering four city blocks. Built and operated by Corrigan Properties, Inc., they offer year-'round air conditioning, among other attractions; people wait for a chance to rent them.

Beatty Engineering Co., Frick Air Conditioning Contractors in Dallas, designed and installed the year-'round system. Four Frick "ECLIPSE" compressors furnish 400 tons of refrigeration. Both the owners and occupants are much pleased with results.

You, too, will be pleased with Frick equipment—whether for air conditioning, ice making, quick freezing or other refrigerating work. Get bulletins and estimates now: write

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

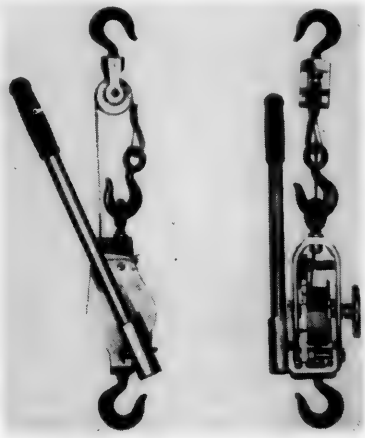
WAYNESBORO, PENNA., U. S. A.

Also Builders of Power Farming and Sawmill Machinery

(Concluded from page 150)

Portable Winch Hoist

A 2-ton capacity portable winch hoist made of high tensile strength aluminum alloy castings is announced by Aluminum Products, Inc., Fort Lauderdale, Fla. Although of unusual light weight it has an overload safety factor of approximately 100%.

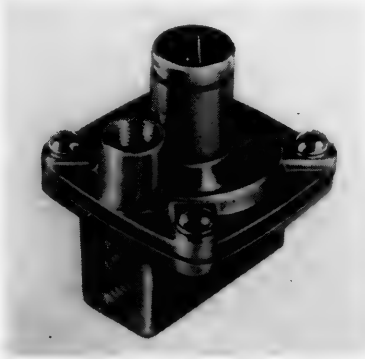


Equipped with 25 ft of preformed aircraft wire rope, it permits a lift or pull of 12-ft double line or 25-ft single line. Shafts and springs are of stainless steel, and the frame casting is designed to protect all working parts against damage. Easily carried or positioned by one man, it is a versatile tool for a multitude of uses.

More information? Circle Item 80, postcard, last page.

Gas Pressure Pilot Regulator

High capacity gas pressure pilot regulator Model H-100, applicable to any pilot light where controlled gas pressure is present, is now in production at Major Controls Co., Corona, Calif.



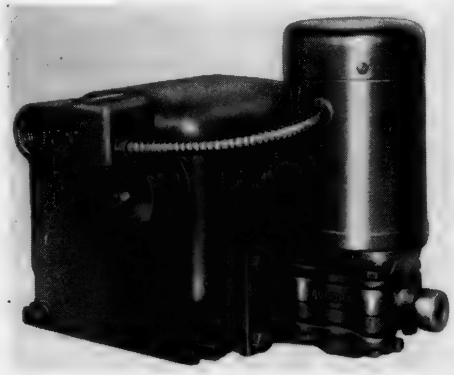
The AGA certified control, suitable for all gases up to 14,000 Btu capacity at three-tenths drop per hour, has a maximum 2-inch flange width, overall height of 2½ inches, weight of 4½ oz, and port sizes of ⅛ and ¼-inch dia.

Made of lightweight aluminum with integral cast guideposts for the location and positive seal of the sensitive Neoprene impregnated Nylon diaphragms. The regulator features a variety of vent connections.

More information? Circle Item 81, postcard, last page.

Condensation Return Unit

Packaged Cond-A-Pac condensation return units in simplex and duplex models, ready to hook to piping and line leads, are announced by Aurora Pump Div., The New York Air Brake Co., Aurora, Ill.



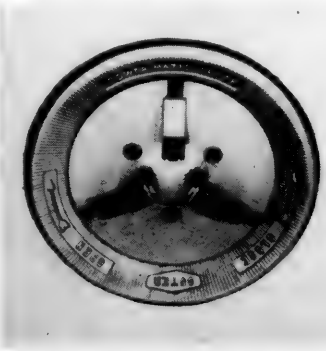
Four sizes are available: two with 500 to 4,000 EDR, 1/6-hp, 8 gpm capacities have 6- and 12-gal receivers respectively; two with 6,000 to 8,000 EDR, 15 gpm, ¼-hp, each, simplex and duplex, have 12-gal receivers. Units operate at 3500 rpm and at 20 psi discharge pressure.

Pumps are close-coupled end suction centrifugals with heavy cast bronze impellers designed for hot water pumping. Returns are 9 inches above floor level. Self venting prevents vapor lock.

More information? Circle Item 82, postcard, last page.

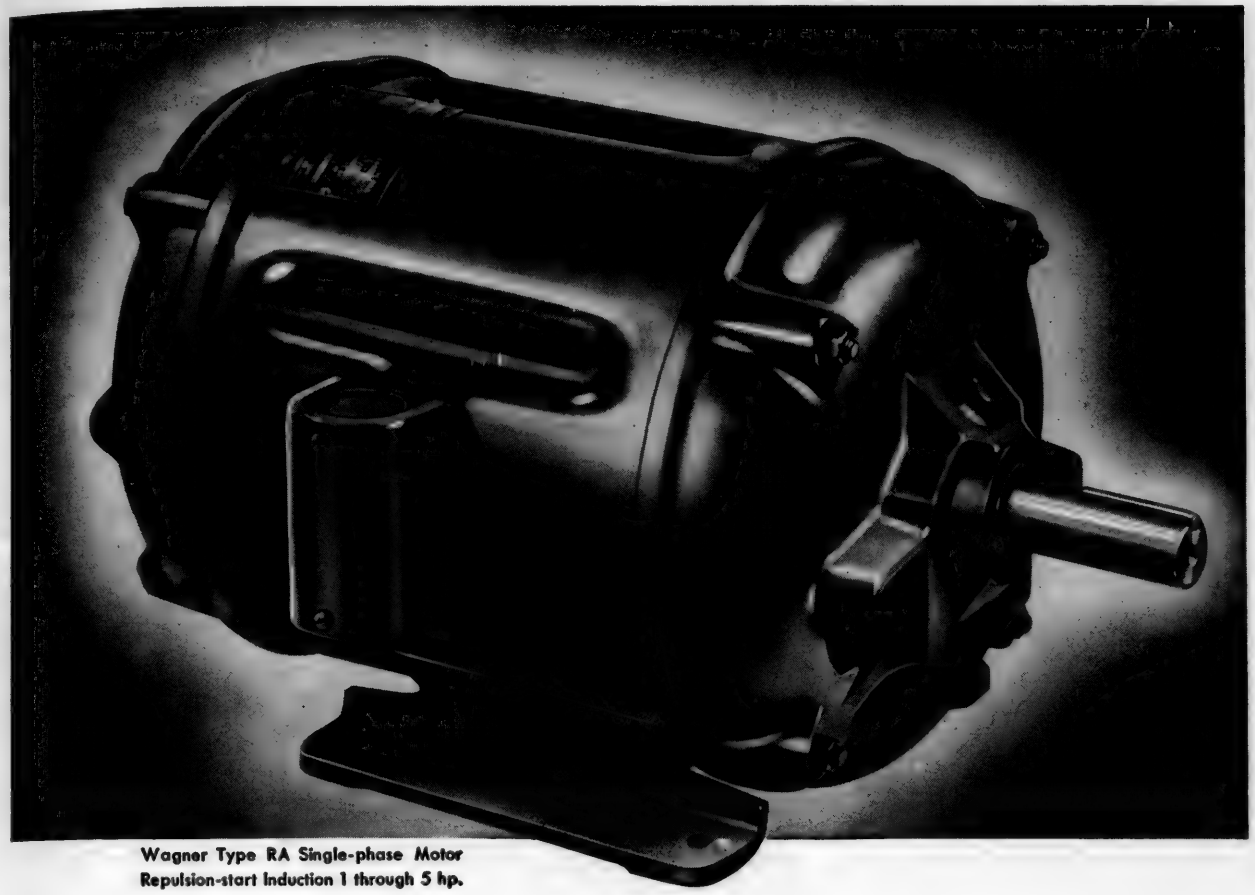
Pipe Gripping Chuck

A new chuck is being furnished on all 2-inch pipe and bolt threading machines which revolve the work, produced by The Oster Manufacturing Co., Wickliffe, Ohio. Known as the Power-Matic, this universal gripping chuck is operated by a hand wheel and requires no bars or tee wrenches to grip the work securely for cutting both right and left hand threads.



The jaws are brought down on the work by means of the hand wheel and the rocking action of the Neoprene bonded insert jaws grips automatically, without hammering. The insert jaws are easily removable for sharpening or replacing without removing the entire jaw body.

More information? Circle Item 83, postcard, last page.



Wagner Type RA Single-phase Motor
Repulsion-start Induction 1 through 5 hp.

NOW...Wagner's high starting torque Integral hp single-phase motor is available in the latest NEMA frame sizes!

The well-known Wagner Type RA Motor is the workhorse of the single-phase motor field. This repulsion-start, induction-run motor combines the best features of the repulsion motor in starting, with those of the induction motor while running at rated operating speeds—ideal for applications requiring high starting torque.

No other single-phase motor has its ability to continually start heavy loads or perform with such complete satisfaction under continuous service.

Specifically designed for compressors, pumps, machine tools, grinders, and conveyors; it is preferred for many other single-phase high inertia or heavy friction starting applications because of its ability to start such loads with low current and with minimum light flicker.

Let a Wagner field engineer show you how these motors can be applied to your needs. Call the nearest of our branch offices, or write us.

OLD FRAME SIZE	NEW FRAME SIZE
203	182
204	184
224	213
225	215
254	254U

4 pole (1750 RPM, 60 cycle and 1450 RPM, 50 cycle) ratings are interchangeable in mounting dimensions with capacitor-start motors of the same ratings.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6463 Plymouth Ave., St. Louis 14, Mo., U.S.A.

M57-11

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

DEGREE-DAYS FOR APRIL, 1957

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 29th Year of Publication of Monthly Degree-Day Data

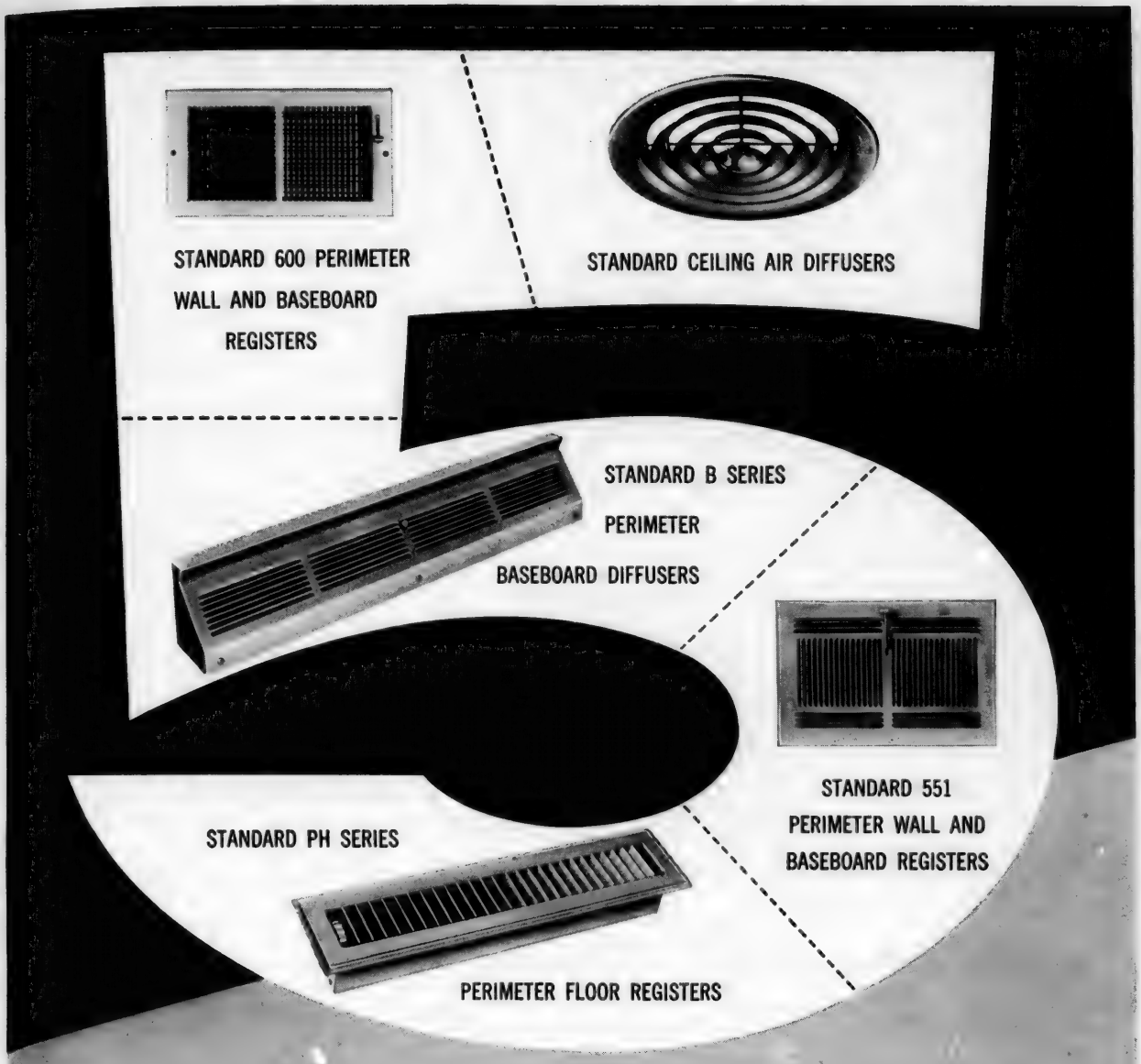
City	April			Season to April 30, incl., from Sept. 1		
	1957	1956	Normal	1956-57	1955-56	Normal
Abilene, Texas (A)	155	135	113	2373	2585	2707
Albany, New York (A)	491	667	597	6457	6973	6642
Albuquerque, New Mexico (A)	317	288	289	3889	3835	4319
Alpena, Michigan (C)	692	800	762	7221	7468	7366
Asheville, North Carolina (C)	235	346	285	3461	4150	3962
Atlanta, Georgia (A)	109	164	133	2209	2867	2806
Atlantic City, New Jersey (C)	394	533	468	4220	4751	4528
Augusta, Georgia (A)	103	164	62	2916	2645	2138
Baltimore, Maryland (C)	240	335	326	3671	4329	4130
Billings, Montana (A)	228	699	564	6755	7239	6655
Binghamton, New York (C)	483	622	570	5878	6522	6232
Birmingham, Alabama (A)	120	173	128	2155	2854	2758
Bismarck, North Dakota (A)	692	819	657	8400	9652	8496
Block Island, Rhode Island (A)	548	671	603	5123	5617	5385
Boise, Idaho (A)	483	424	453	5864	5531	5549
Boston, Massachusetts (A)	466	575	534	5347	5792	5506
Buffalo, New York (A)	508	652	636	5866	6509	6405
Burlington, Iowa (A)	431	508	425	5654	6238	5888
Burlington, Vermont (A)	582	719	681	7159	7639	7420
Cairo, Illinois (C)	169	236	182	3388	3878	3709
Charleston, South Carolina (C)	48	87	43	1436	1882	1769
Charlotte, North Carolina (A)	123	224	172	2575	3227	3176
Chattanooga, Tennessee (A)	143	231	179	2745	3462	3339
Cheyenne, Wyoming (A)	839	758	717	6577	6845	6855
Chicago, Illinois (C)[b]	523	528	518**	(a)	5706	5764**
Cincinnati, Ohio (C)	288	368	314	3921	4476	4424
Cleveland, Ohio (A)	471	566	531	5332	5859	5727
Columbia, Missouri (A)	348	398	326	4418	5090	4958
Columbia, South Carolina (A)	102	154	77	1989	2699	2284
Columbus, Ohio (C)	368	481	408	4676	5338	5102
Concord, New Hampshire (A)	517	748	660	6937	7341	7146
Concordia, Kansas (C)	421	449	341	5048	5694	5157
Dallas, Texas (A)	120	84	75	2208	2328	2272
Dayton, Ohio (A)	402	515	435	5037	5652	5373
Denver, Colorado (A)	702	581	535	5452	5602	5765
Des Moines, Iowa (A)	457	523	438	5977	6736	6183
Detroit, Michigan (A)	497	573	558	5734	6187	6085
Devils Lake, North Dakota (C)	756	1000	750	9161	10593	9301
Dodge City, Kansas (A)	429	439	347	4804	5079	4908
Dubuque, Iowa (A)	500	621	543	6630	7265	6892
Duluth, Minnesota (C)	786	913	801	9042	9274	8730
Elkins, West Virginia (A)	762	799	477	4578	5243	5456
El Paso, Texas (A)	102	132	110	2210	2244	2641
Ely, Nevada (A)	712	704	639	6809	6856	6759
Escanaba, Michigan (C)	737	853	804	7695	7882	7863
Evansville, Indiana (A)	258	371	251	4103	4652	4264
Fargo, North Dakota	668	895	687	8442	9827	8769
Fort Smith, Arkansas (A)	181	214	127	3041	3465	3164
Fort Wayne, Indiana (A)	490	538	516	5691	6117	5991
Fort Worth, Texas (A)	142	97	5	2356	2391	2356
Fresno, California (A)	156	183	145	2586	2533	2489
Galveston, Texas (C)	32	19	30	747	1019	1211
Grand Junction, Colorado (A)	478	371	402	5770	5018	5628
Grand Rapids, Michigan (A)	539	627	606	6147	6714	6647
Green Bay, Wisconsin (A)	616	764	696	7553	8031	7715
Greensboro, North Carolina (A)	193	320	241	3355	4041	3760
Greenville, South Carolina (A)	131	212	161	2641	3216	3028
Harrisburg, Pennsylvania (A)	358	484	423	4870	5339	5116
Hartford, Connecticut (A)	482	631	528	5934	6192	5893
Hatteras, North Carolina (C)	(a)	217	171	(a)	2806	2367
Havre, Montana (C)	628	716	597	7728	8810	7717
Helena, Montana (A)	679	687	654	7692	8141	7606
Houston, Texas (C)	37	30	27	891	1152	1276
Huron, South Dakota (A)	611	757	558	7393	8906	7517
Indianapolis, Indiana (A)	396	483	432	4977	5606	5405
Jackson, Mississippi (A)	114	133	81	1878	2429	2202
Kansas City, Missouri (A)	342	377	292	4493	4970	4769
Knoxville, Tennessee (A)	168	279	196	2862	3736	3540
La Crosse, Wisconsin (A)	494	664	552	6826	7876	7295
Lander, Wyoming (A)	802	681	687	7071	7530	7714
Lewiston, Maine (O)	612	719	693	7029	7042	7318

(a) Data not available. [b] Grant Park weather station.

Normal figures in this table are based on 30-year period covering 1921 to 1950, inclusive, as compiled and published by the U. S. Weather Bureau.

Figures in this table, with two exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively.

[Table concluded on page 156]


STANDARD 600 PERIMETER WALL AND BASEBOARD REGISTERS
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Degree-Days for April, 1957 (Concluded)

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 29th Year of Publication of Monthly Degree-Day Data

City	April			Season to April 30, incl., from Sept. 1		
	1957	1956	Normal	1956-57	1955-56	Normal
Lincoln, Nebraska (C)	438	499	377	5340	6162	5654
Little Rock, Arkansas (A)	140	167	122	2707	3105	2964
Los Angeles, California (C)	111	191	129	919	1437	1364
Louisville, Kenucky (A)	264	348	285	3984	4417	4340
Lynchburg, Virginia (A)	238	356	289	3739	4321	4066
Macon, Georgia (A)	68	105	62	1671	2260	2049
Madison, Wisconsin (A)	512	619	573	6645	7122	6915
Marquette, Michigan (C)	692	852	789	7632	7751	7707
Memphis, Tennessee (A)	145	185	139	2763	3248	3113
Meridian, Mississippi (A)	107	132	85	1871	2444	2324
Milwaukee, Wisconsin (A)	598	652	621	6638	6799	6693
Minneapolis, Minnesota (A)	545	686	570	7209	8312	7489
Moline, Illinois	448	537	453	5899	6428	6112
Montgomery, Alabama (A)	82	116	80	1675	2280	2137
Nashville, Tennessee (A)	175	249	186	3063	3714	3470
New Haven, Connecticut (A)	496	617	567	5471	5831	5695
New Orleans, Louisiana (C)	31	28	19	763	1171	1175
New York, New York (C)	376	506	456	4561	5059	4879
Newark, New Jersey	367	516	450	4700	5215	5093
Norfolk, Virginia (A)	173	280	265	2925	3577	3395
North Platte, Nebraska (A)	615	686	489	6320	6983	6227
Oak Ridge, Tennessee	178	252	227	2839	3834	3970
Oakland, California (A)	213	301	282	2651	2960	2671
Oklahoma City, Oklahoma (A)	284	257	169	3681	3898	3481
Omaha, Nebraska (A)	431	502	389	5614	6436	5948
Parkersburg, West Virginia (C)	305	438	347	4284	4878	4618
Peoria, Illinois (A)	431	491	435	5502	5953	5843
Philadelphia, Pennsylvania (C)	326	462	369	4110	4708	4430
Phoenix, Arizona (A)	47	55	62	1222	1318	1492
Pittsburgh, Pennsylvania (C)	355	467	402	4518	5095	4898
Pittsfield, Massachusetts	570	761	690	6860	7493	7165
Pocatello, Idaho (A)	616	555	561	6736	6561	6523
Portland, Maine (A)	608	743	693	7003	7339	7099
Portland, Oregon (C)	332	309	347	4137	3157	3847
Providence, Rhode Island (A)	463	625	570	5539	5990	5783
Pueblo, Colorado (A)	601	473	456	5131	5408	5479
Raleigh, North Carolina (A)	162	275	172	3008	3677	3046
Rapid City, South Dakota (A)	716	774	615	6923	7334	6974
Reading, Pennsylvania (C)	353	465	411	4656	5113	4921
Red Bluff, California (A)	173	179	177	2525	2574	2495
Reno, Nevada (A)	572	556	519	5747	5612	5465
Richmond, Virginia (A)	201	323	271	3496	4106	3889
Rochester, New York (A)	520	677	615	6140	6780	6477
Roswell, New Mexico (A)	240	222	185	3151	3430	3396
Sacramento, California (C)	152	189	196	2419	2352	2510
St. Joseph, Missouri (A)	389	444	297	5092	5703	4591
St. Louis, Missouri (C)	301	336	270	4200	4574	4368
Salt Lake City, Utah (A)	489	446	453	5493	5388	5552
San Antonio, Texas (A)	71	21	34	1203	1435	1579
San Diego, California (A)	122	182	151	956	1452	1416
Sandusky, Ohio (C)	489	530	513	5386	5825	5601
San Francisco, California (C)	222	310	279	2152	2443	2275
Sault Ste. Marie, Michigan (A)	793	902	846	8373	8507	8517
Savannah, Georgia (A)	65	102	43	1466	2005	1710
Scranton, Pennsylvania (A)	485	602	516	5968	6427	5798
Seattle, Washington (C)	376	378	396	4224	4504	3991
Sheridan, Wyoming (A)	742	738	645	7102	7632	7287
Shreveport, Louisiana (A)	91	112	61	1897	2190	2117
Sioux City, Iowa (A)	498	587	474	6300	7253	6705
Spokane, Washington (A)	506	448	561	6644	6742	6331
Springfield, Illinois (A)	386	464	350	5094	5623	5084
Springfield, Missouri (A)	310	383	295	4215	4741	4551
Syracuse, New York (A)	507	656	570	6107	6786	6207
Toledo, Ohio (A)	509	575	555	5810	6413	6077
Topeka, Kansas (C)	370	395	295	4687	5190	4794
Trenton, New Jersey (C)	364	476	429	4631	5115	4924
Tulsa, Oklahoma	235	245	173	3449	3736	3540
Utica, New York (O)	671	687	588**	7123	7024	6543**
Valentine, Nebraska (A)	673	751	543	6896	7660	6683
Walla Walla, Washington (C)	332	288	338	5126	5177	4639
Washington, D. C. (C)	241	335	314	3813	4299	4178
Wichita, Kansas (A)	360	379	280	4478	4839	4463
Williston, North Dakota (C)	711	815	663	8346	9397	8499
Winnemucca, Nevada (A)	601	545	546	6207	5975	5942
Yakima, Washington (A)	402	361	408	6119	6429	5580

For footnotes, see page 154.

AIRCOUSTAT SILENCES ALL FREQUENCIES IN THE AUDIO-FREQUENCY RANGE!
Resonators hold low-frequency sounds
Periodic internal structure dampens middle-frequency noise
Sound-absorbent materials suppress high frequencies

AIRCOUSTAT* Sound Traps eliminate air conditioning noise at 50% less cost

Acoustical Performance Guaranteed. Easy to Install. Pre-Engineered — No Design or Layout Headaches.

Revolutionary AIRCOUSTAT Sound Traps require no special tools for installation . . . reduce your labor costs and lower your installation time. Units fit any size or shape of duct. If AIRCOUSTAT fits *geometrically*, it fits *acoustically*.

AIRCOUSTAT is the most efficient method of sound-deadening you can provide your customers. A 7-foot AIRCOUSTAT unit suppresses as much sound as 100 feet of ordinary duct lining. AIRCOUSTAT eliminates all frequencies in the entire audio-frequency range, silences entire systems or selected outlets. Flow resistance and pressure drop are lower. 4 series cover applications ranging from general offices to recording studios.

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BOOK REVIEWS

Publications abstracted in this department should be ordered direct from publisher

THERMODYNAMICS

The third edition of Thermodynamics, by Virgil Moring Faires, professor of mechanical engineering, North Carolina State College, has just been published. The text has been designed for a full year's course in this subject but the material in the book is flexible enough to permit use in a shorter course.

The author had as his objective to present a theoretical treatment of thermodynamics in context with enough applications to motivate the student's comprehension in depth and breadth; to explain things so clearly that the student can benefit most from individual study; to prepare the student for advanced study and at the same time to provide him with a satisfactory terminal course.

The chapters in the book cover conservation of energy, energy relations, the ideal gas, processes of ideal gases, cycles, enthropy and the second law, compression and expansion of gases, the gas turbine, cycles for internal combustion engines, performance of internal combustion engines, mixtures of gases, combustion and the products of combustion, imperfect gases, liquids and vapors, processes of vapors, the steam power plant and nuclear energy, vapor cycles, reciprocating steam engines, modern cycles for steam power plants, flow of fluids, turbines, the reversed cycle, gas-vapor mixtures, and the transfer of heat.

Thermodynamics, by V. M. Faires. Cloth bound, 6 x 9 inches, 543 pages. Published by The Macmillan Company, 60 Fifth Ave., New York 11, N. Y.

DETROIT PLUMBING CODE

Phases of plumbing system design and installation, as applied to work in Detroit, Mich., are covered in the Official Plumbing Code of the City of Detroit.

Standards and methods of installation specified in the code are the minima deemed necessary, in accordance with present knowledge, to adequately safeguard health and safety of people in the community.

In addition to the various sections covering the plumbing code, there are articles on water pipe sizing, methods of heating water, a list of accepted devices and materials, and engineering data.

Official Plumbing Code of the City of Detroit, Mich. Paper bound, 5½ x 8½ inches, 313 pages. Published by Department of Buildings and Safety Engineering, City of Detroit, Mich. Price, $3.

DOMESTIC OIL BURNERS

The Installation and Servicing of Domestic Oil Burners, by Frank V. Mitchell and Robert W. Mitchell has been written for the mechanic and others who wish practical information on this subject.

This book covers the theory of oil burning, and how it is applied mechanically to the oil burner. The information is practical and there are a large number of illustrations to show operation of burners and controls.

It covers such points as heating systems, how to figure firing rates, combustion chambers, pumps, filters, oil burner wiring, motors, transformers, thermostats, operating and limit controls, primary controls, oil burner installations, combustion testing, check-ups and service tips.

The Installation and Servicing of Domestic Oil Burners, by F. V. Mitchell and R. W. Mitchell. Cloth bound, 8½ x 11 inches, 348 pages. Published by Arco Publishing Co., 480 Lexington Ave., New York 17, N. Y. Price, $5.

HYGROMETRY

The subject of hygrometry has become important both in the field of pure research and in industrial process work. It can be said to have developed from minor status to its present importance during the past fifty years. Scientific principles are covered in Hygrometry by H. Spencer-Gretory and E. Rourke.

The authors examine the basic principles upon which the operation of every known type of hygrometer is based, from earliest forms to the modern types. Both the theory and the practice of the subject are covered.

Some of the chapters in the book cover vapor pressure of water and ice; vapor pressure of solutions; dew point practice; moisture content of highly compressed permanent gases; the Assmann psychrometer; hair hygrometer; diffusion hygrometer; gravimetric and electrolytic hygrometers; lag effects.

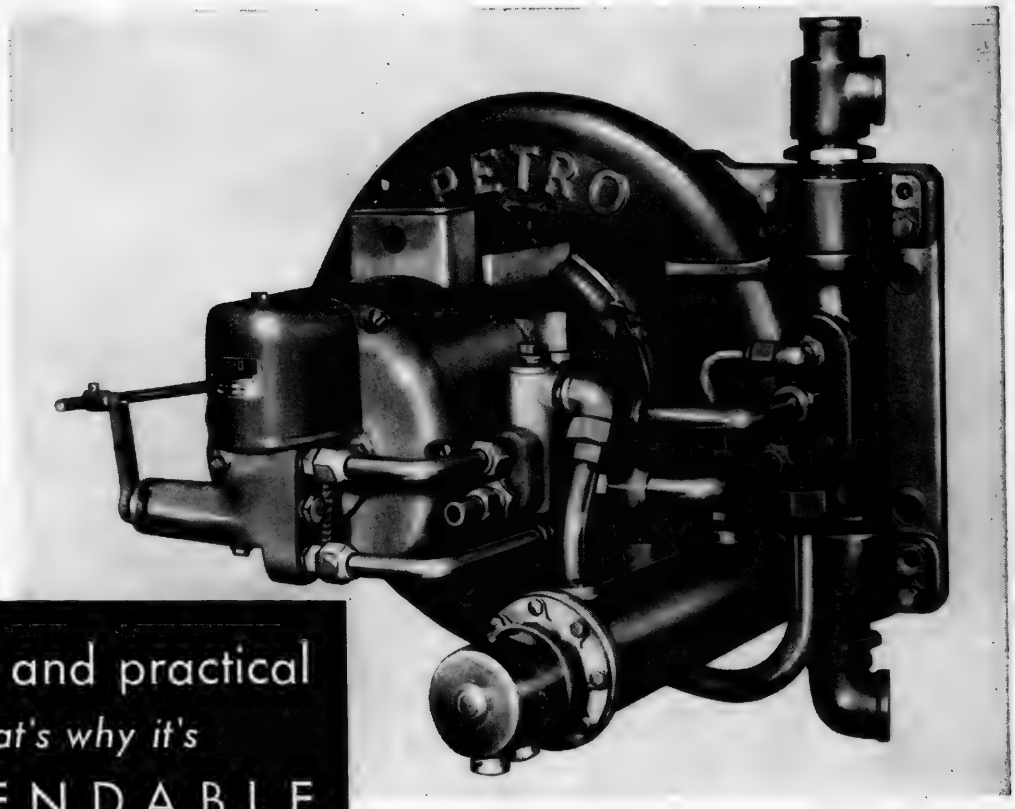
Hygrometry, by H. Spencer-Gregory and E. Rourke. Cloth bound, 5½ x 8½ inches, 254 pages. Published by Crosby Lockwood & Son, Ltd., 26 Old Brompton Rd., S.W. 7, London, England. Price, 36 shillings.

• • •

PERFORMANCE OF AUTOMATIC STORAGE-TYPE DOMESTIC WATER HEATERS—The University of Illinois has issued Bulletin No. 436 on Investigation of the Performance of Automatic Storage-type Gas and Electric Domestic Water Heaters based on research conducted by The Engineering Experiment Station, University of Illinois, in cooperation with the American Gas Association. Tests were conducted on commercial models of commonly used comparable and representative water heaters. University of Illinois, Urbana, Ill. Price, 60 cents.

BOILER RATING HANDBOOK—The fourth edition of the Automatic Heating Boiler Rating Handbook lists the ratings for various types of radiation—cast iron radiators, baseboard and convectors. It also lists the amount of actual standing radiation for the various boilers. Included are the ratings of boilers going as far back as 50 years. The information for the boilers covers net steam rating, net water rating and firebox size. Paper bound, 124 pages. Fuel Oil News, Bayonne, N. J. Price $4.

Petro HEAVY OIL BURNER



Simple and practical *that's why it's* DEPENDABLE

Residual oils are low cost fuels. They have higher heat value than light oils, and usually cost less per gallon. But in spite of their economy they are often avoided because they are considered difficult to handle and burn. A moderate change in temperature can change them from a fluid to a sluggish semi-solid.

These heavy oils (Nos. 5 and 6) are easily controlled and burned by the Petro system which is remarkably free from mechanical complexities.

1. A simple oil heater automatically warms the oil to a point where a common viscosity is reached. (Fuel oils approach this at a temperature of about 160 degrees).

2. An automatic valve passes the oil to the nozzle only when it is warm enough for accurate metering and instant ignition.

This is the basis of the Petro "Thermal Viscosity Principle." The Petro burner isn't fancy; it isn't temperamental; but it *stays on the job.*

In spite of its ruggedness, the Petro heavy oil burner is precision equipment which will operate efficiently with any type of automatic control system.

Petro oil burners have been the steady, reliable work horses in heavy oil firing for over 50 years. They have saved their owners untold thousands of dollars in low fuel and maintenance costs.

For further information, please mail coupon.

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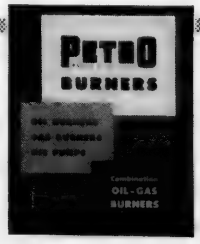
Over 50 years of leadership in automatic heating and power equipment



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Please send me literature and specification sheets on the money-saving Petro forced draft firing system.

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NEWS OF THE MONTH

ENGINEERS, LIKE DOCTORS

need staffs around them to attend to details, freeing the experts for planning and supervision.

The engineer of the near future will be better trained and have a staff of specialists to help him with technical details of his job, much as a doctor in a hospital, J. F. Downie Smith, Dean of Engineering, Iowa State College, Des Moines, predicted.

Dean Smith was the principal speaker at a luncheon following the opening general session of the three-day Great Lakes district meeting of the American Institute of Electrical Engineers.

Pointing out that there are not enough doctors to do all the necessary work in a hospital or a medical office, Dean Smith said that the doctor gets support from nurses, technicians, anaesthetists, etc., but is himself responsible for diagnoses, operations and other medical problems.

"The engineer of the not too distant future will, in my view, occupy a somewhat similar position in industry," he said. "He will be supported by technicians in several fields, such as draftsmen to do drafting, and calculators to do relatively straightforward calculations. Specialists will be on call, at least in the larger plants, on the many specialties necessary for the solution of the problem confronting him, but the professional engineer will be responsible for the successful completion of the problem. This, of course, may be a small part of a much larger problem.

• **TIME WASTED**— "In the small plants much of the specialized as well as the general engineering must be done by the one man—but he still could probably use technicians to help. It may be assumed that this is now the case in industry. But as I see it, the engineer is, in too many cases, spending his time on matters which could logically be done by technicians, if they were only available.

"It has been customary practice for engineers when they reach a certain plateau in salary to be confronted with the problem of continuing at the same general salary level in strictly engineering work, or to branch forth into management in order to advance financially. There is a serious question whether this is, or is not, a waste of engineering talent. Some say yes; others think the engineering training gives good background for management. In some companies today men trained in the business aspects take over the non-engineering work involved in new developments, leaving the engineer to do what he is most qualified to do, resulting in greater over-all efficiency and general satisfaction.

• **BETTER TRAINING**— "If these views are correct, then the engineer of the future should be better trained technically than at present, largely by acquiring more basic knowledge of engineering, leaving the applied until he goes through what would amount to an internship in industry. This corresponds somewhat to the "Engineer in Training" of the State Boards of Engineering Examiners.

"Some broadening study should also be included in the program, to some extent to stimulate the man to further study and interest after graduation.

"At the completion of this internship he should be qualified to practice his profession and be in charge of all of those necessary to support him in his work. At that time he should have acquired the breadth of view necessary for a professional man, and have been completely indoctrinated with the Ethics of the Profession, in a manner similar to the doctor.

"These are my views. At the moment they cannot be put into effect because of the scarcity of supporting staff. In my opinion this situation should be rectified at the earliest possible time."

CONTRACTORS' AWARD

for 1957 goes to Joseph C. Fitts. Former secretary and editor served 38 years.

Joseph C. Fitts, Hackensack, N. J., was the recipient of the Distinguished Service Award for 1957, a citation given each year by the Mechanical Contractors Association of America (formerly HPACCNA) to a member who has contributed long and lasting service to the mechanical contracting industry.

Assistant secretary and secretary of the National Association for more than a third of a century, Mr. Fitts received the award during the 68th annual convention of the MCAA held in May at the Fontainebleau Hotel, Miami Beach, Fla.

The award winner has rendered 38 years of loyal service to the Association. As secretary of the Association and editor of its Official Bulletin, his guidance through the years resulted in successful industry-wide standards for materials, equipment and data, certified pipe welding program, NRA code on fair trade practice, apprentice training program, and certified heating.

NEW YORK CITY

leading trend to fully air-conditioned cities. High level of new construction is basic factor.

New York City, the "big building capital," is leading the nation toward completely air conditioned cities, according to a survey released by Carrier Corp., Syracuse, N. Y.

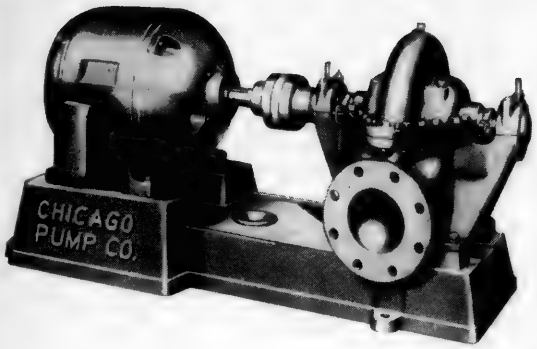
Since the end of World War II, some 71 large multistory buildings providing 22,840,000 square feet of air conditioned space have been built in Manhattan. This has touched off what is today the air conditioning indus-

(*Continued on page* 162)

FROM *Chicago*

TOP QUALITY PUMPS

Engineered for plumbing, heating, and air conditioning systems

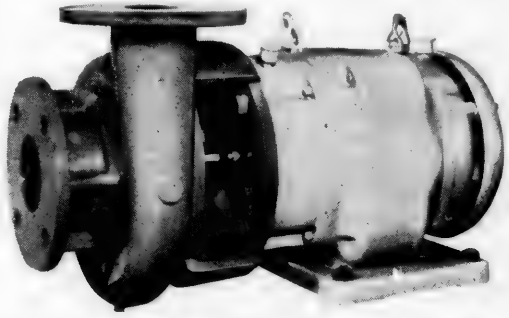


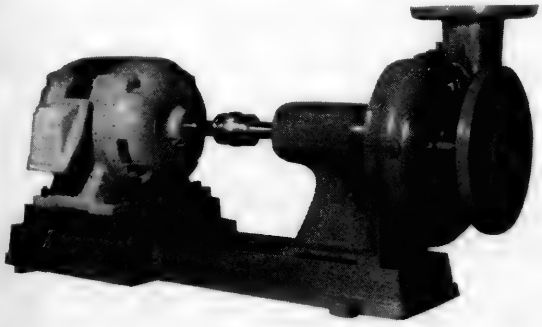
TYPE D DOUBLE SUCTION HORIZONTALLY SPLIT CASE PUMP

A rugged, heavy-duty pump that guarantees long, trouble-free service. The rotating assembly may be inspected without disconnecting the piping. Capacities up to 1900 G.P.M. Heads to 530 Ft. Described in Bulletin 101.

TYPE CC CLOSE COUPLED PUMP

Handles the toughest pumping jobs efficiently and in the least possible space. May be mounted in any position as long as the motor is not lower than the pump. Equipped with leak-proof mechanical seal. Capacities up to 500 G.P.M. Heads to 215 Ft. Described in Bulletin 108.





TYPE FC PEDESTAL MOUNTED FLEXIBLE COUPLED PUMP

Like the CC, all FC pumps are equipped with the most reliable mechanical seal ever built into a pump. Ceramic-faced stationary seat is highly resistant to wear. Accurately lapped surfaces and automatic adjustment for wear assures long life under strenuous service. Described in Bulletin 107.

For trouble-free, "worry-proof," efficient pumping at all times — specify Chicago Pumps. Write for complete information.

CHICAGO PUMP COMPANY
Building Pumps
Subsidiary of Food Machinery & Chemical Corporation
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622 Diversey Parkway Chicago 14, Illinois

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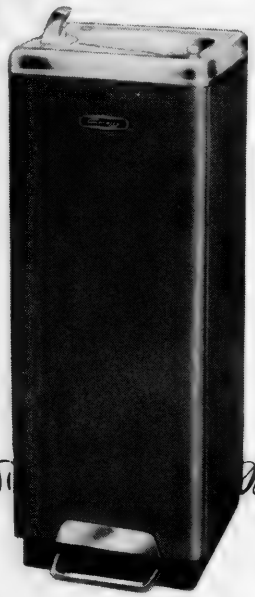
NEW YORK

More built-in EXTRAS

for more service . . .
more convenience . . .
more value!



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5-YEAR
GUARANTY

Broadest in the industry! You get a new cooler if failure occurs in the Hermetic Refrigeration System or Cooling Tank . . . and Cordley pays freight *both ways*. Get a copy—see for yourself!

CORDLEY OFFERS ALL THESE FEATURES
. . . and many more!

- Solid stainless steel splash-proof top
- Squirt-proof bubbler jet
- Fully sealed refrigeration system
- 7-point thermostat
- Contamination-proof – refrigerant coils bonded *externally*
- Extra service connections–for both glass filler and remote outlets
- Bubbler jets aimed for *easy* drinking – no neck craning
- Attractive, adaptable styling

NOW AVAILABLE IN 3 DISTINCTIVE LINES:

There's a Cordley cooler to meet any drinking water requirements!

VALUABLE FREE BULLETIN . . .
"HOW TO SELECT A WATER COOLER"
WRITE TODAY!

CORDLEY & HAYES
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try's greatest market, installations in older buildings. Within only the last four years some 24 major existing New York skyscrapers have installed year-round central systems. The combined cooling capacity that has gone into service in these New York office buildings since the war is some 110,000 tons.

• **NEW STIMULATES OLD**— "The high level of new construction in New York has been a basic factor in motivating installation of year-round conditioning systems in existing office edifices all across the country. The present distribution of Carrier business between new and existing multi-story building air conditioning nation-wide is that for every new structure equipped at the time of erection, five systems are installed in existing buildings. In order to remain in competition for first class tenants, existing buildings have found it necessary to modernize by providing air conditioned space."

Also, firms with offices in new air conditioned structures in New York are demanding the same feature in the existing building space they occupy in other parts of the country where the availability of modern facilities is not so pronounced. It is predicted that the trend in skyscraper air conditioning in New York would continue, with the rate of existing building installations increasing.

• **PRINCIPLE OF SATURATION**—Air conditioning for existing office buildings has been the biggest source of contracts for large installations since it caught up with and overtook systems installed in new structures the latter part of 1952. Since then, both markets have continued to grow. During 1954, the volume of business for existing buildings was nearly triple that for new structures. The margin continued to increase and during 1956, reached the five to one proportion.

When air conditioned office space reaches a level of about 18% of the total office area in a given city, the remainder of the buildings must then also air condition. New York hit this "principle of saturation" mark three or four years ago. Chicago and Philadelphia swiftly followed.

WORLD HEALTH ORGANIZATION

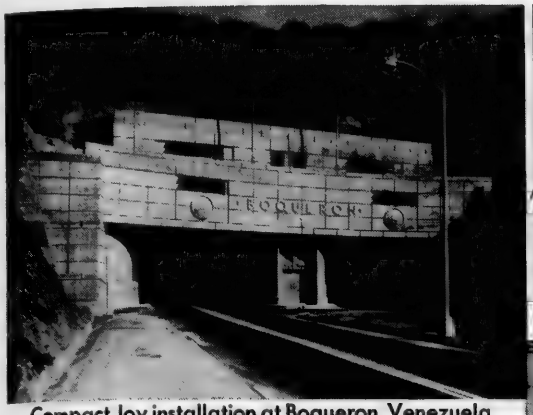
to sponsor international conference in Switzerland on air pollution.

An eminent local scientist arrived in Geneva, Switzerland, to plan an international conference on air pollution for the World Health Organization. Retained as a special consultant by WHO, Dr. Louis C. McCabe, President of Resources Research, Inc., will assist in designing the program for the conference which will be held in Geneva later this year. Subjects for discussion, papers and authors will be recommended by Dr. McCabe. Experts from all over the world will be selected to participate in the conference.

• **CONCERN MOUNTING**— Concern over air pollution has been mounting in many countries because of rapid industrialization, the growing populations in or near industrial centers, increased use of fuels for power and heating,

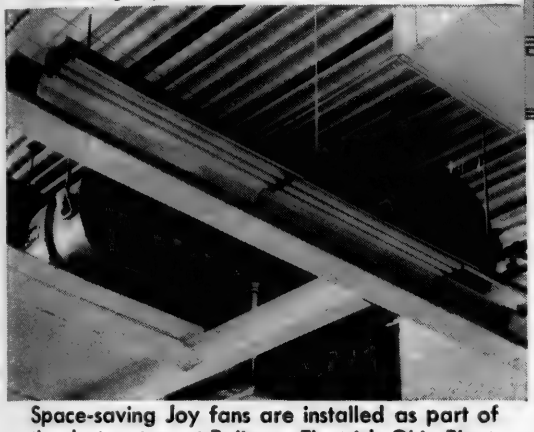
(Continued on page 164)

Ventilation Problems: Gone with the Joy Axivane Wind

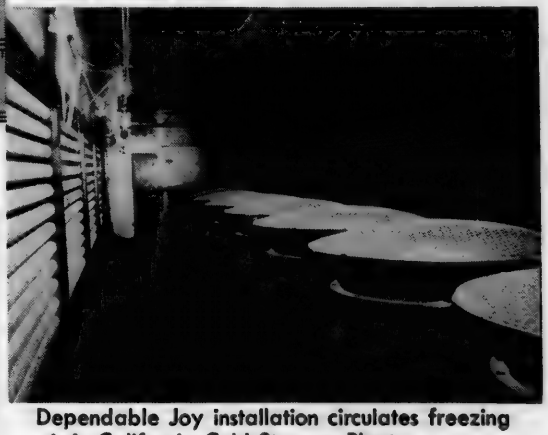


Compact Joy installation at Boqueron, Venezuela, moves huge quantities of air.

Joy Axivane design means power savings at Alcoa's Texas Plant.



Space-saving Joy fans are installed as part of the duct system at Reliance Electric's Ohio Plant.



Dependable Joy installation circulates freezing air in California Cold Storage Plant.

'Round the World, JOY Handles the Hard Ventilating Jobs

If you have a really tough ventilating job coming up ... moving large volumes of air . . . variable pressures and volumes . . . unpredictable resistance . . . cramped space allotment . . . better take a look at the Joy Axivane Fan.

Compact design, with the motor *inside* the fan gives you more air per pound of fan and motor . . . more air per cubic foot of fan. The straight-thru design allows you to install it *right in* the duct; becomes a *part* of the duct; eliminates offsets, elbows, drives and guards.

Pre-lubricated, double-shielded ball bearings permit the fan to be installed in *any* position. Adjustable blades allow for unpredictable resistance . . . permit changes in volume or pressure, *after* the fan is installed.

You choose from a standard line of over 136 models . . . and still have the advantage of Joy's custom engineering service. Joy Axivane Fans can make your next ventilating job a lot easier . . . that's one reason why Joy gets the tough assignments.

Get complete information about Joy Axivane Fans from ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.

WSW 19840-17

WRITE FOR FREE BULLETIN 17-40

JOY ... EQUIPMENT FOR INDUSTRIAL PLANTS ... FOR ALL INDUSTRY

STATIONARY AIR and GAS COMPRESSORS • NON-LUBRICATED COMPRESSORS • BOOSTER COMPRESSORS VACUUM PUMPS • PORTABLE COMPRESSORS • INDUSTRIAL FANS • PORTABLE BLOWERS • FOUNDATION BREAKERS • HOISTS • ELECTRICAL PLUGS, RECEPTACLES and POWER DISTRIBUTION SYSTEMS

Petrometer
SERIES 1400
LIQUID DEPTH GAUGES

ACCURATE and EASY TO INSTALL

Available in 4 Models, Petrometer Series 1400 Tank Gauges operate on the sound principle of hydrostatic pressure. No moving parts, no expensive electrical or electronic equipment. Large vertical scale gives accurate, easy-to-see reading. And construction features make installation easy.

For complete information send for Bulletin 6004

All Petrometer Gauges are guaranteed for one year

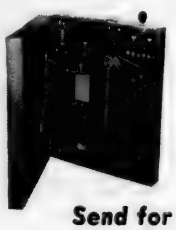
Measure Specific Gravity Accurately!

...and from a remote point

The Petrometer remote reading Specific Gravity Indicator is accurate to .001 Sp. G. unit, with interpolation to .0005 unit! It's easy to install... and operates on the simple, sound principle of a differential bubbler.

An ideal instrument for plant or laboratory for measuring specific gravity of any liquid... paints, fuel, resins, pharmaceuticals, chemical solutions.

All functional parts are conveniently mounted on rear of panel, accessible by swinging open the cabinet door.



Send for Bulletin 7004

Petrometer CORPORATION
43-22 TENTH STREET, LONG ISLAND CITY 1, N.Y.

and the sharp rise in the use of automobile and diesel engines. Both here and abroad there have been instances, such as the disasters in Donora, Pennsylvania and London, where air pollution has been responsible for deaths. In addition to these more dramatic effects of air pollution, scientists have lately reported that serious chronic diseases may be related to breathing air containing low levels of contamination over long periods of time. Researchers at the National Institute of Health recently pointed out that air pollution may be more important than cigarettes in causing cancer of the lung. Other workers have reported finding cancer-producing substances in automobile and diesel engine exhausts. The harmful effects, however, are not confined to cities, for air pollutants are sometimes carried into rural areas where they do damage to crops and livestock. With the atomic age, the threat of radioactive pollution of the atmosphere by peaceful or military use of nuclear power has arisen.

In calling the conference, the World Health Organization is taking the first step in combatting air pollution on an international scale.

AIR HOUSE

displayed at New York's Coliseum is nylon balloon completely supported by air from conditioning unit.

A 1600-sq-ft house made of vinyl-coated nylon fabric, designed by Frank Lloyd Wright, is entirely supported by air from residential air-conditioning equipment. A product of U.S. Rubber Company, the structure was unveiled at the International Home Exposition at the Coliseum, New York City.

Because of extra heat generated by flood lighting and visiting crowds, two, instead of the usual one, air conditioners were used to maintain a satisfactory level of comfort. The light, tough fabric, called Fiberthin, is impervious to moisture and vapor penetration. Thus, close humidity control is essential. Balanced dampers introduce the correct amount of outside air through the Chrysler Airtemp conditioning units to compensate for air lost by leakage and constant opening of doors.

Projected uses for the air house include workmen's shelter, storage warehouse, and low-cost summer home. It may be packed in an auto trunk.

WINDOWLESS FACTORIES

made possible with year-round air conditioning pays off in lower building costs, operational advantages.

Reporting on experience in the last five years with gas air conditioning of its new plants in regions where climatic conditions made controlled air temperature an important consideration, several distinct advantages were cited by H. Campbell Stuckeman, vice president in charge of plant construction, Rockwell Mfg. Co., Pittsburgh, Pa.

In addition to the usually-cited advantages, such as the attraction of better personnel and higher productivity, re-

(Continued on page 166)

Norman Three Sixty ®

INSTALLED IN SCHOOL CORRIDOR

ECONOMICAL COMFORT SPECIFICALLY DESIGNED FOR MODERN SCHOOLS

Norman Gas-Fired Forced Air Schoolroom Heating and Ventilating System

If you're planning a new school or adding rooms to an old one, be sure to check into the advantages of the Norman Schoolroom System — quality engineered after years of research and study in school heating and ventilating requirements. Outside air only is used for combustion.

IN NEW SCHOOLS—the Norman Schoolroom System eliminates the need for extra space or a separate building to house a central heating plant. No interconnecting supply or return mains are needed.

FOR ADDITIONS—simply add a Norman Classroom Package for each new classroom. It has everything needed for healthful, economical and fully automatic heating and ventilating.

NORMAN OVERHEAD HEATING FOR SCHOOL CORRIDORS, CAFETERIAS

Norman Three-Sixty Forced Convection Overhead Gas Heater with

- **Sealed Combustion System**
- **Exclusive Electric Ignition**
- **Forced Exhaust**
- **100% Outside Air For Combustion**

The beautiful new Norman circular design gas-fired overhead unit more than meets all requirements for heating large areas in schools . . . provides a full 360° umbrella of warmth . . . offers exclusive safety and performance features.

Norman® products company

MODERN OVERHEAD HEATER FOR MODERN STORES
Adds a touch of luxury to the most attractive shoppe, store or super-market.

Mail the coupon now for literature and specifications on the Norman gas-fired Schoolroom System which provides efficient forced air distribution through ducts and diffusers in strong furniture metal bookshelf sections.

NORMAN PRODUCTS CO.
1166 Chesapeake Ave., Columbus 12, Ohio

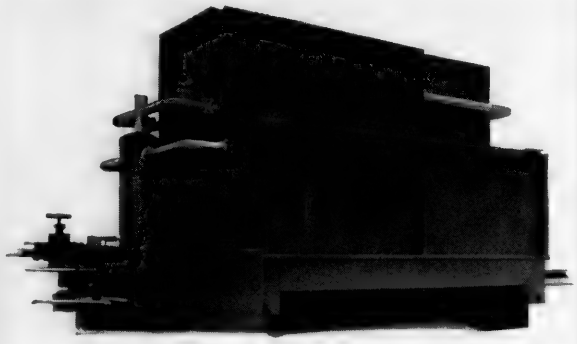
Please send literature and specifications on the Norman Schoolroom System and the all-new Norman Three Sixty.

NAME _____ TITLE _____

COMPANY NAME _____

ADDRESS _____

CITY _____ ZONE ____ STATE _____



NIAGARA SECTIONAL
***Aeropass* CONDENSER**
gives you lower cost refrigeration,
saves you ***LABOR,*** *Power, Water*

- **Because Niagara "Duopass" pre-cooling removes super-heat and gas condenses at lower temperature.**
- **Because the system is automatically purged of oil.**
- **Because the new design improves the heat transfer to the out-door air by evaporation.**
- **Because these features keep the condenser working for long life with "new plant" efficiency... always full capacity.**
- **Because you save 95% of cooling water cost.**

You save labor in upkeep. With full access to all parts and interior piping you see everything in easy inspections. You head off dirt accumulation and corrosion. Casing panels are removable without moving the coils. The coils can be cleaned from both sides.

First cost is low; freight is low because of the lowest space/weight ratio; you save much labor in erection. Capacity range is 90 to 240 tons. No other condensing method gives you so much saving in money and trouble.

Write for Niagara Bulletin 131.

NIAGARA BLOWER COMPANY
NEW YORK 17, N. Y.
Dept. HV-6, 405 Lexington Avenue
District Engineers in Principal Cities

NIAGARA *Over 40 Years' Service in Industrial Air Engineering*

duction of absenteeism due to colds, etc., Mr. Stuckeman cites some reduction of initial building costs owing to elimination of the need for windows, along with additional operational advantages and cost savings made possible by windowless construction.

These last include an estimated 5 to 10% more usable floor space as a result of the elimination of any need for aisles next to windows, better engineered lighting system not dependent on outside lighting, elimination of maintenance, cleaning, and painting costs for windows, and increased safety from better lighting and removal of diversions outside windows.

Most of the Rockwell plants employ the Carrier gas absorption system.

SWITCHING REVOLUTION

compared by Dean Van Vleck at international symposium to 19th Century Industrial Revolution.

John H. Van Vleck, dean of engineering and applied physics at Harvard University, said that the United States is in the midst of a "switching revolution" much like the industrial revolution of the 19th century.

Prof. Van Vleck spoke at the International Symposium on the Theory of Switching at the Computation Laboratory of Harvard University.

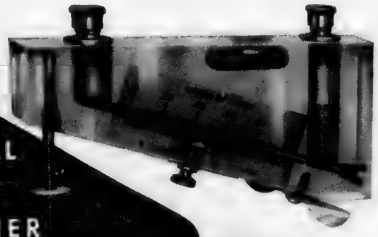
• **FREEDOM FROM DRUDGERY**—"It is perhaps hard for us to realize that we are living now in a revolution similar to the industrial revolution—namely the changes taking place in our clerical, book-keeping, and computational devices and techniques," he said. "Both revolutions center around labor-saving devices, in one case physical labor, in the other case clerical or computational labor. Both free mankind from labor of a drudging sort. Most people probably visualize routine labor in physical rather than mental terms, but there is also drudgery in long unvarying computation.

"The labor-saving machines of the industrial revolution freed their operators from much physical exertion, but in my opinion there is not much parallelism in the switching revolution, in the sense that the new machines do not, by and large, free their operators, constructors and servicers from thinking. The coding and understanding of modern computation instruments demands intellects of a high order. The new devices can function only if there is a human brain to guide, design and code them."

• **A NEW SCIENCE**—These remarks opened the largest international conference ever held in the field of switching theory. It began on April 2 at Harvard's Computation Laboratory, and for the next three days, hundreds of scientists, engineers, mathematicians and businessmen heard papers on this subject by experts from Belgium, Germany, Holland, Spain, Sweden, Switzerland, Yugoslavia, and the United States.

Switching Theory is a new branch of science which deals with electrical devices which operate in two states —*off-on, high-low, conducting-not conducting,* etc. Examples of such devices are vacuum tubes, relays, recti-

(Concluded on page 168)



GET PEAK RESIDENTIAL AIR CONDITIONER EFFICIENCY WITH A Dwyer

AIR VOLUME GAGE

ACCURACY at a glance. Match static pressure drop across system's evaporator exactly to manufacturer's ratings in hundredths-of-an-inch water column. Brings top system efficiency —better sales!

LIFETIME construction with no moving or delicate parts. Solid transparent plastic block—almost indestructible.

COMPLETE ready-to-use pocket-size kit with gage, rubber tubing, connectors, pressure tips, spring holders, and gage oil fits into 8" x 7" plastic pouch. Ideal for field use by engineers and installers.

Dwyer CONTROLS GAGES

WRITE FOR BULLETIN B30

F. W. DWYER MFG. CO.

P. O. BOX 373-N • MICHIGAN CITY, INDIANA

SARCO
EASY TO CONVERT SINGLE TO DUPLEX
Simply remove flange of Condensate pump, add a pump-motor with alternator. Reduce your pump inventory!

SARCO PUMPS

CONDENSATE AND VACUUM

give you this big advantage...

UNDIVIDED RESPONSIBILITY
by Sarco for both pumps and heating specialties!

Now Sarco expands its extensive heating line...by adding *condensate and vacuum pumps*...offering you in still larger measure the protection and convenience of *undivided responsibility*.

Shown above is the streamlined Sarco type S condensate pump. Its many advantages include:

Easy conversion of Single to Duplex pump as described in photo — no need to carry full stock of both! Low 7½" inlet. Close coupling.

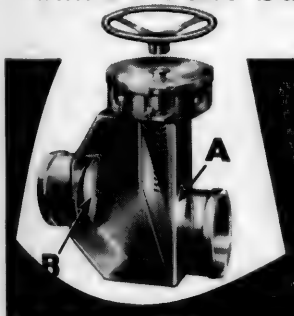
Write for Sarco Condensate and Vacuum pump bulletins, to Sarco Company, Inc., Empire State Bldg., N.Y. 1, N.Y.

SARCO

2157-F

HERE'S HOW YOU CAN END BASEMENT FLOODING

with BOOSEY backwater valves



Manually-operated spade valve (A) and automatic swing valve (B) are two significant features of the Boosey backwater valve.

Basement flooding caused by back pressure from street sewers can be controlled by Boosey backwater valve #109. Even low-lying areas with overloaded sewers are no problem.

Other Boosey products—drains, grease interceptors, air gaps—all are designed to solve the problems you face every day. Select and install with confidence—write for Boosey catalog today.

NORMAN BOOSEY MFG. CO.

528 AVERY AVE., DETROIT 8, MICH.

BOOSEY

(57-P-1)

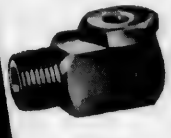
.... to beat sun heat

SPRAY NOZZLES

for evaporative

ROOF COOLING...

Reduce indoor temperatures on hot sunny days 10 to 20 degrees . . . decrease cost of air conditioning systems by lowering tonnage needs in refrigeration. Complete choice of spray nozzles . . . non-clogging, Whirljets, with cone spray . . . and water saving Streamjets.



For complete information write for Roof Cooling Bulletin 81.

SPRAYING SYSTEMS CO.

3261 Randolph • Bellwood, Illinois

ADVANCED SPRAY NOZZLE DESIGN FOR NEW DIMENSIONS IN CONTROL AND PERFORMANCE

(Concluded from page 166)

fiers, and magnetic cores, which are the basic components of telephone exchanges, computing machines, data-processing devices and the new machines for the translation of languages. Switching Theory is the theoretical basis for automation and the automatic factory.

EQUIPMENT ORDERS UP

eighteen percent for commercial and industrial heating, ventilating, and air conditioning equipment.

Orders for new commercial and industrial heating, ventilating and air conditioning equipment for the first two months of this year ran 18% ahead of new orders during the same period last year, according to Air Moving and Conditioning Association, Detroit, Mich.

Total shipments for the same period were up 17% over a year ago, the Association reports. Leading in sales gains was the centrifugal fan group, which reported 40% more orders during January and February, 1957, than in the same two months a year ago. With shipments dropping behind new orders, this group also reported a net increase in its backlog of unfilled orders.

Second largest gain was reported to AMCA by producers of central station air conditioning units. This group reported both sales and shipments as over 25% ahead of the same period in 1956.

Power roof ventilator producers reported a slight increase in both shipments and orders over 1956.

Canadian Degree-Days for April, 1957*

City	April		Cumulative	
	1957	Normal**	1956-57	Normal
Calgary, Alta.	795	770	8758	8510
Charlottetown, P. E. I.	887	870	7862	7770
Crescent Valley, B. C.	624	610	7616	7210
Edmonton, Alta.	731	760	9184	9420
Fort William, Ont.	873	890	9704	9640
Grande Prairie, Alta.	792	830	9924	9930
Halifax, N. S.	725	765	6532	6762
London, Ont.	573	650	6689	6900
Medicine Hat, Alta.	693	620	7237	8130
Moncton, N. B.	818	830	8125	8020
Montreal, P. Q.	605	730	7677	7970
North Bay, Ont.	769	840	8248	9050
Ottawa, Ont.	610	730	7864	8250
Penticton, B. C.	497	490	6606	6010
Prince George, B. C.	744	740	9403	8500
Quebec City, P. Q.	766	850	7608	8810
Regina, Sask.	832	790	10073	9980
St. John, N. B.	808	830	7811	7870
Saskatoon, Sask.	823	800	10152	10190
Timmins, Ont.	904	1010	10009	10510
Toronto, Ont.	540	646	6146	6582
Vancouver, B. C.	462	480	5302	4910
Victoria, B. C.	499	470	5118	4520
Windsor, Ont.	538	580	6041	6290
Winnipeg, Man.	786	810	9976	9988

* These data are supplied through the courtesy of the Meteorological Division Air Service Branch, Department of Transport, Canada.

** New normal figures covering 30-year period, 1921 to 1950.

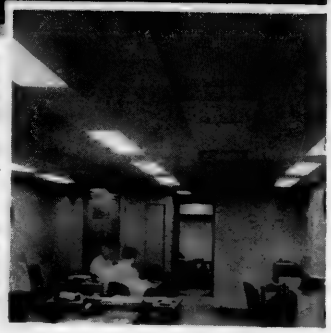
The Department reports a slight revision in the figures for March, as published in last month's issue. Corrected figure is: Grande Prairie, Alta., 1414.

NEW ECONOMY IN RADIANT HEATING...

...is now possible with the completely integrated SIMPLEX radiant-acoustical ceiling.

One trade rapidly installs this *one* completely integrated ceiling which includes all radiant ductwork, aluminum acoustical panels, diffuser panels and framing for recessed fixtures. *One* medium, air, is responsible for heating, cooling, ventilation and humidity control.

The result is a system which combines the speed of response and installation economy of forced air systems with the superior comfort of radiant heating and cooling—at prices which have competed successfully with quality conventional forced air systems of heating and air conditioning.



(Above) Some 30,000 sq. ft. of SIMPLEX radiant-acoustical ceiling help keep patients in the new Beckley Memorial Hospital, Beckley, W. Va., comfortable. Archt: Isadore Rosenfield, Engr: John D. Dillon, both of N. Y.

(Right) Attractive anodized aluminum ceiling surface is free of conventional air diffusers and dirt rings. Station Master's Office in Grand Central Station, N. Y.

Send today for AIA booklet containing photographs, details and specifications.

SIMPLEX CEILING CORP.

552 W. 52 St., New York 19, New York

Please send me folder 39b describing your radiant-acoustical ceiling.

Name .....

Firm .....

Address .....

City ..... Zone ..... State .....

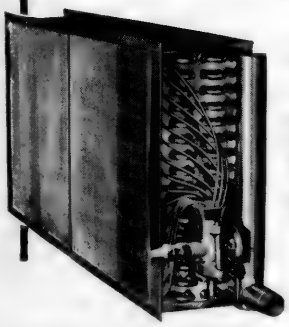
Air Cooling COILS

2 to 15 Ton CAPACITY

NEW Complete Line

REMPE

COMPLETE WITH MULTI-OUTLET EXPANSION VALVES MADE-ON— READY TO INSTALL



4 Row Coils — for residential jobs.

6 Row Coils — for commercial jobs.

Precision built to insure top performance and to give trouble-free service.

Write for bulletins and prices.

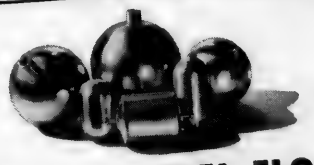
Complete facilities for fabrication of pipe coils — all types — all materials. Engineering service. Send details for price.

HEAT TRANSFER EQUIPMENT REMPE CO. Since 1890

REMPE COMPANY

358 N. Sacramento Blvd., Chicago 12, Ill.

HARRIS



STAINLESS STEEL FLOATS

Write for Harris Catalog with technical float data.

If you have a liquid level control operating under high pressure or high temperature, or in a corrosive liquid, be sure to specify Harris Type 304 Stainless Steel Floats. The inherent strength of stainless steel makes them ideal for this purpose, and all that strength has been retained with the Harris Atomic Hydrogen welding process that produces a smooth, uniformly strong and ductile weld without oxidation.

Where corrosion is more severe Harris recommends its Type 316 Stainless Steel Floats.

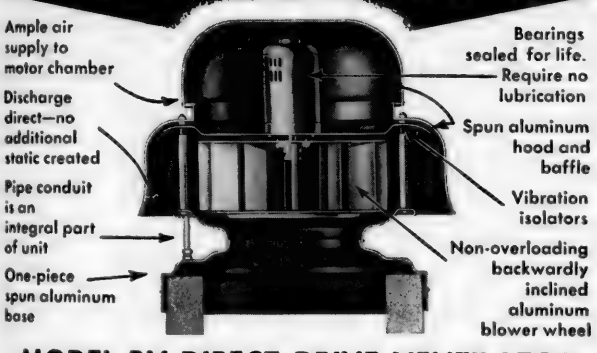
Take advantage of Harris' half century of float experience and consult us on any float problem.

ARTHUR HARRIS & CO.

206 No. Aberdeen Street, Chicago 7, Illinois

FLOATS

All-Aluminum Cook Ventilators


Ample air supply to motor chamber
Discharge direct—no additional static created
Pipe conduit is an integral part of unit
One-piece spun aluminum base
Bearings sealed for life. Require no lubrication
Spun aluminum hood and baffle
Vibration isolators
Non-overloading backwardly inclined aluminum blower wheel

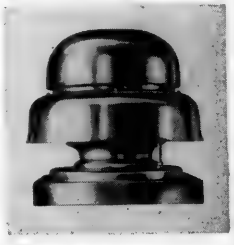
MODEL BV DIRECT DRIVE VENTILATOR
7" to 24" sizes (390 to 5,020 cfm)

All-aluminum construction decreases roof loads. Handsome low silhouette design is available in direct or belt drive. Light starting torque of aluminum blower wheel increases bearing and motor life (and belt life on belt drives). Non-sparking, non-overloading blower wheel.

Motors of all models are outside air stream.

Write for Catalog, or see Sweet's Architectural File for condensed catalog.

In Canada write to H. F. Clarke, Ltd., 244 W. Broadway, Vancouver, B. C.



Same appearance in belt drive up to 16,500 cfm.

COOK VENTILATORS

LOREN COOK COMPANY

Berea, Ohio

IT COSTS LESS TO USE THE BEST!

PLS

For your convenience: available in handy 1-lb. brush top cans.

1. Takes less PLS to give a perfect seal.

2. One compound for many services: water...oil...gas...steam...chemicals...petroleum products—low and high pressures.

3. Never washes out—one application lasts forever.

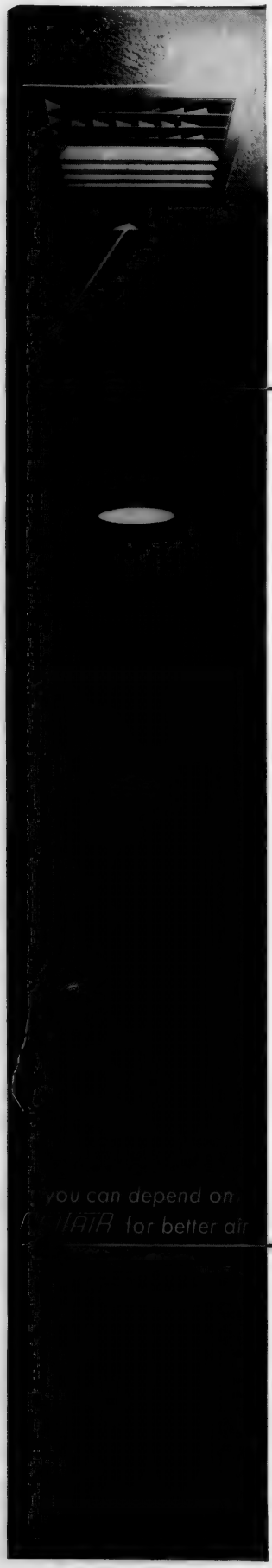
4. Never hardens: joints may be easily broken after years of service—no damaged connections.

Prove it to yourself. Send for a free sample. Crane Packing Co., 6431 Oakton St., Morton Grove, Ill., (Chicago Suburb).

JOHN CRANE

CRANE PACKING COMPANY

In Canada: Crane Packing Co., Ltd., Hamilton, Ont.



Custom Made

AIR DIFFUSERS with DIFFUSING VANES

Each AGITAIR square and rectangular air diffuser is custom designed to meet your requirements of air flow and interior treatment.

These AGITAIR diffusers have built-in diffusing vanes, scientifically arranged in unlimited louver patterns to provide certified 100% draftless air distribution from any ceiling or wall location.

AGITAIR Catalog R-107 shows you how to select the proper size and pattern for your job conditions.

Write for your copy today.

AIR DEVICES INC.
185 MADISON AVE., N. Y. 16, N. Y.
air diffusers • filters • exhausters

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available

PLANT MAINTENANCE SHOW—3rd Western Plant Maintenance & Engineering Show and Conference, in the Civic Auditorium, San Francisco, Calif. Clapp & Poliak, Inc., 759 Monadnock Bldg., San Francisco, Calif. ..... **JUNE 11-13, 1957.**

ASHAE SUMMER MEETING — Semi-annual meeting, American Society of Heating and Air-Conditioning Engineers, Manoir Richelieu, Murray Bay, Quebec, Canada. A. V. Hutchinson, executive secretary of the Society, 62 Worth St., New York 13, N. Y. ..... **JUNE 24-26, 1957.**

APPLIED HEAT TRANSFER CONFERENCE—First National Conference on Applied Heat Transfer, sponsored by the heat transfer division and central Pennsylvania section of the American Society of Mechanical Engineers, in cooperation with the College of Engineering and Architecture of the University, to be held at Pennsylvania State University, University Park, Pa. Secretary of the ASME, 29 W. 39th St., New York 18, N. Y. ..... **AUGUST 11-15, 1957.**

CRYOGENIC ENGINEERING CONFERENCE—1957 Cryogenic Engineering Conference at the National Bureau of Standards, Boulder, Colo. K. D. Timmerhaus, secretary, Cryogenic Engineering Conference Committee, Department of Chemical Engineering, University of Colorado, Boulder, Colo. ..... **AUGUST 19-21, 1957.**

AUTOMATION CONFERENCE AND EXHIBIT—12th Annual Instrument Automation Conference and Exhibit, sponsored by the Instrument Society of America, Pittsburgh, Pa., to be held at Cleveland Auditorium, Cleveland, Ohio. Secretary of the Society, 313 Sixth Ave., Pittsburgh 22, Pa. ..... **SEPTEMBER 9-13, 1957.**

AGA MEETING—Annual convention, American Gas Association, Kiel Auditorium, St. Louis, Mo. AGA, 420 Lexington Ave., New York, N. Y. ..... **OCTOBER 7-9, 1957.**

NATIONAL SAFETY COUNCIL EXPOSITION—45th National Safety Congress & Exposition, to be held in Chicago, Ill. Headquarters not yet announced. Secretary of the National Safety Council, 425 N. Michigan Ave., Chicago, Ill. ..... **OCTOBER 21-25, 1957.**

AIR POLLUTION CONFERENCE—Air Pollution Conference, to be held in Chicago, Ill. Headquarters not yet announced. Co-sponsored by Armour Research Foundation and the Midwestern Air Pollution Prevention Association. Conference secretary of Armour Research, 10 W. 35th St., Chicago 16, Ill. ..... **NOVEMBER 13-14, 1957.**

ASRE MEETING—Semi-annual meeting of the American Society of Refrigerating Engineers, at the Hotel Shoreland, Chicago, Ill. Secretary of the Society, 234 Fifth Ave., New York 1, N. Y. ..... **NOVEMBER 14-16, 1957.**

WHOLESALERS—Annual meeting, Air Conditioning and Refrigeration Wholesalers, Sheraton Hotel, Chicago, Ill. Secretary, 2607 N. High St., Columbus, Ohio. ..... **NOVEMBER 16-18, 1957.**

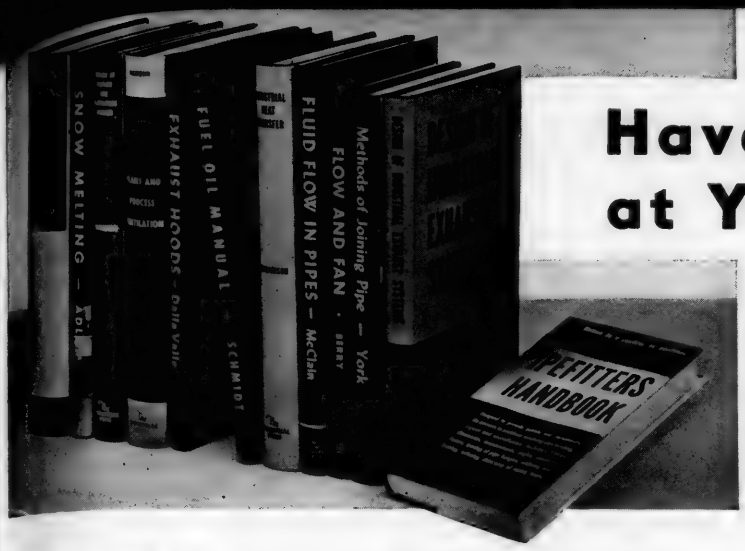
AIR-CONDITIONING AND REFRIGERATION EXPOSITION — 10th exposition of the Air-Conditioning and Refrigeration industry, sponsored by the Air-Conditioning and Refrigeration Institute, at Chicago's International Amphitheatre, Chicago, Ill. Secretary of the Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. ..... **NOVEMBER 18-21, 1957.**

WARM AIR HEATING—Annual convention, National Warm Air Heating and Air Conditioning Association, Hotel Morrison, Chicago, Ill. George Boedeker, Secretary, NWAHACA, 640 Engineers Bldg., Cleveland, Ohio ..... **NOVEMBER 18-22, 1957.**

ASHAE WINTER MEETING — 64th annual meeting, American Society of Heating and Air-Conditioning Engineers, Pittsburgh, Pa. A. V. Hutchinson, secretary ASHAE, 62 Worth St., New York, N. Y. ..... **JANUARY 27-29, 1958.**

JOINT ASHAE-ASRE MEETING—Joint summer meeting, American Society Heating and Air-Conditioning Engineers and American Society Refrigerating Engineers, Hotel Leamington, Minneapolis, Minn. ..... **JUNE 23-25, 1958.**

EXPOSITION AND ASHAE CONVENTION—65th annual meeting, American Society Heating and Air-Conditioning Engineers (Jan. 26-29, 1958) and 14th International Heating and Air Conditioning Exposition, Philadelphia, Pa. ..... **JANUARY 26-30, 1959.**



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How to design, build or buy an exhaust system that will function adequately and economically, and meet the requirements of law and industrial hygiene. Covers flow of fluids—hood forms—air flow through hoods—pipe resistance—piping design—dust separators—low pressure conveyors—centrifugal exhaust fans—structural details—field measurements and their interpretation.

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Practical hood design, including the latest principles of air handling, contaminant dilution and transport velocities. Includes design of hoods for control of dust, mist, fumes, vapors and gases with many particular references to processes such as bagging, drilling, screening, grinding, welding, plating and many others. Simple formulas and diagrams show exact procedures.

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The *flow* of gas through ducts, and *fan* performance and control are authoritatively covered in this useful work. Covers principles of moving air through ducts, including elements of fan selection and control, duct arrangement, system characteristics and flow analysis. Gives basic data and describes methods used to calculate system resistance, plus practical information that will help in selecting a fan for a given duty.

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Covers characteristics and uses of every type and grade of fuel oil. Explains the meaning of each oil property, and shows how this information is applied in selecting, handling and burning fuel oil. A special chapter covers fuel oil additives and how they are used, and another covers troubles encountered in using fuel oil and shows correct remedies.

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1860 BROADWAY *Dept. HV* *NEW YORK 23, N. Y.*

NEW CATALOGS

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

ROLL-TYPE AIR FILTERS—Bulletin No. 780 describing its line of roll-type air handling units that incorporate automatic air filtration, has been released by Herman Nelson Co., Div. of American Air Filter Co., Inc., Louisville, Ky. Explaining the adaptability of filtering by the roll to the company's heating and ventilating units, industrial heaters, auditorium unit ventilators, and air conditioning units, the bulletin includes advantages of the disposable filtering media that permits once a year maintenance, and the operation of the roll-type unit. Dimension drawings and charts for the basic unit and for accessories are shown.

Circle **Item 84** on Inquiry Card

PNEUMATIC SPECIALTIES—Available from Watts Regulator Co., Lawrence, Mass., is a 4-page folder, F-15B, describing and illustrating the company's line of pneumatic specialties, including filters, regulators, lubricators, and combinations of these units for air lines ¼ through 1-inch dia.

Circle **Item 85** on Inquiry Card

NYLON FLOAT VALVE—A descriptive sheet on the company's Nylon float valve is available from Hydo Valve Corp., Austin, Texas. It describes the construction and advantages of this valve, as well as applications in cooling towers, evaporative coolers, and level control of crude and refined petroleum products.

Circle **Item 86** on Inquiry Card

TEMPERATURE CONTROL SYSTEMS—Colored, four-page bulletin, F 2287-4, discusses the application of Electronic temperature controls made by Barber-Colman Co., Rockford, Ill., for the heating, ventilating and air conditioning field. It explains all the features, functions and advantages of the system which provide efficient and economical control for any type of heating and air conditioning equipment. All components and accessories, used in the various types of systems, are illustrated and specific applications of each are discussed.

Circle **Item 87** on Inquiry Card

REFRIGERATING UNITS—A 12-page bulletin, No. 97-F, describing the company's line of refrigerating units for air conditioning and refrigerating applications, is available from Frick Company, Waynesboro, Pa. Designs and applications of air and water-cooled units in sizes from ¼ to 15 hp are illustrated and discussed.

Circle **Item 88** on Inquiry Card

FANS, BLOWERS, EXHAUSTERS — Bulletin 502 describes many of the different heavy duty industrial fans manufactured by Robinson Ventilating Co., Zelienople, Pa. The first portion calls attention to pictures of company's custom-built fans ready for service. The next portion of the bulletin is given over to photographs of the fans operating in different types of plants. The third section contains an index to the various types of fans built and, is an index to its line of equipment, as bulletin numbers are given for the different fans described. Among them are: mine type disc fans, tubeaxial fans, wall type fans, and pressure blowers.

Circle **Item 89** on Inquiry Card

STEAM TRAPS—A 4-page bulletin that contains in condensed form all the information needed to buy or specify its line of Super-Silvertop steam traps is available from The V. D. Anderson Co., Cleveland, Ohio.

Circle **Item 90** on Inquiry Card

FILTERS-DRIERS—Bulletin 40-10 dealing with the Catch-All filter-drier is available from Sporlan Valve Co., St. Louis, Mo. The 12-page brochure, illustrated in two colors, covers application, installation, capacities, and specifications. In addition, it gives the facts about decomposition of refrigerant oils, and acids in the refrigeration system.

Circle **Item 91** on Inquiry Card

AIR PRESSURE REDUCING VALVE—A 24-page catalog, No. 113 published by Tuttle & Bailey, Div. of Allied Thermal Corp., New Britain, Conn., describes the company's Type PRV pressure reducing valve for high and low pressure air distribution systems. Included are applications of the valve, a section on sound and recommended decibel levels, and dimensional details.

Circle **Item 92** on Inquiry Card

ELECTROSTATIC AIR CLEANER—A 4-page brochure on electrostatic Pliotron air cleaners, manufactured by The Goodyear Tire and Rubber Co., Inc., Akron, Ohio, is available from Akron Rubber Co., New York, N. Y., distributor. Its ability for fine air cleaning, and ease of cleaning the media are discussed.

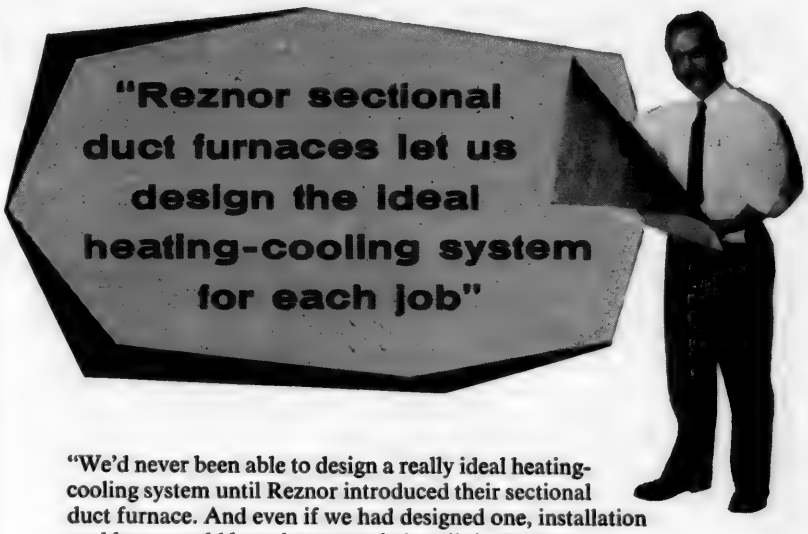
Circle **Item 93** on Inquiry Card

OIL-FIRED WATER HEATERS—A detail sheet published by Bock Corporation, Madison, Wis., describes the company's oil-fired, storage-type glass lined water heaters, available in 30, 50, and 70-gal sizes. Specifications and roughing-in dimensions are given.

Circle **Item 94** on Inquiry Card

(Continued on page 174)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.



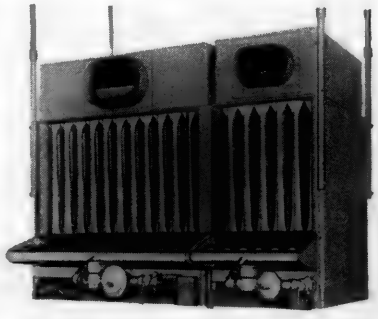
"We'd never been able to design a really ideal heating-cooling system until Reznor introduced their sectional duct furnace. And even if we had designed one, installation problems would have been stymied until the Reznor sectional duct furnace came along.

"Sectional assembly eliminates the installation problems which formerly prevented the use of large capacity custom-engineered duct systems. With the new Reznor DS sectional duct furnaces, we can specify system capacities of two million BTU or more knowing that they can be assembled on the job from sections weighing no more than 315 pounds.

"Reznor sectional duct furnaces free us completely from packaged heating equipment which isn't exactly right for any one job because it has to be almost right for so many jobs. Now we start with a Reznor duct furnace, which is simply nothing more than a compact, highly efficient gas-fired heat exchanger with a complete set of combustion controls. To this we add the components for air moving, cooling, cleaning, and humidifying selected to meet exact job requirements. For our client it means greater efficiency, greater comfort, and lower cost.

"Reznor sectional duct furnaces are a heating engineer's dream come true . . . and our long experience with Reznor gas unit heaters gives us complete assurance that these new duct furnaces will be tops in efficient performance, dependable service and long life, too."

If you're not taking advantage of the design freedom these new units offer you, you're really missing something. Write today for free catalog or call your nearby Reznor distributor for details. You'll find him listed under "Heaters-Unit" in the yellow pages of your telephone directory.



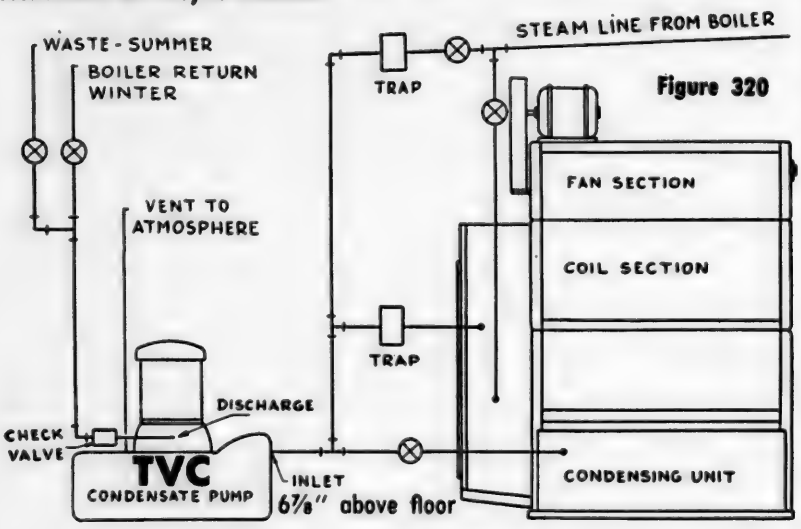
REZNOR
THE WORLD'S LARGEST-SELLING GAS UNIT HEATERS
REZNOR MANUFACTURING COMPANY
64 Union Street, Mercer, Pa.

THE DUAL PURPOSE PUMP

1 SUMMER The TVC Pump disposes of the condensate resulting from the moisture removed from the air by the air conditioner.

2 WINTER The TVC Pump returns the steam condensate to the heating plant.

Figure 320 illustrates simple piping hookup with a unit used for air conditioning in the summer and heating in the winter. This type of unit is efficient, economical and easy to maintain.



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LOW SPEED (1750 RPM)
Assures long motor life

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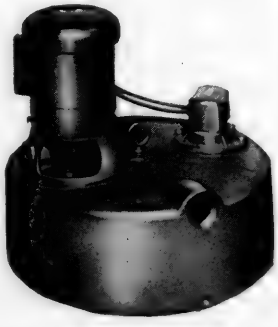
Does not rust out – last for a lifetime



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NEW CATALOGS

(Continued from page 173)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

SEAMLESS PIPE AND TUBING—Engineers associated with the design or operation of tubular equipment used in severe corrosive environments will be interested in a new technical data folder, TDC-185, recently published by the Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa. The folder discusses the seamless titanium metal pipe and tubing produced by the division. It presents in detail the size range and tolerances as well as a complete description of the mechanical, physical and working properties of the metal in tubular form.

Circle **Item 95** on Inquiry Card

DEMINERALIZATION EQUIPMENT—A catalog-type brochure which discusses and illustrates ion-exchange water purification techniques and equipment is offered by Enley Products, Inc., Brooklyn, N. Y. Its all-plastic unit, for large and small industrial applications, is described.

Circle **Item 96** on Inquiry Card

PLASTIC VALVES AND FITTINGS—A 16-page illustrated bulletin which describes polyvinyl chloride (PVC) valves and fittings has been issued by the Walworth Company, New York, N. Y. The bulletin presents application tables on the performance of normal impact PVC and high impact PVC valves and fittings for handling about 315 different fluids that attack other materials. Four tables give data on physical properties, recommended working pressures and effect of temperature on working pressure.

Circle **Item 97** on Inquiry Card

BOILER WATER TREATMENT—Reprint of a paper, No. 111, on the selection of water treating processes for medium pressure boilers which was presented at the last annual ASME conference in New York City is available from Cochrane Corporation, Philadelphia, Pa.

Circle **Item 98** on Inquiry Card

ELECTRIC THERMOSTAT—An electric thermostat for use in refrigerating, ventilating and alarm systems is described in Bulletin RT-804 available from Robertshaw-Fulton Controls Co., Greensburg, Pa. Model E1 is a single throw, reverse acting thermostat which closes on a rising temperature. It is available in temperature ranges up to 800 deg F. Bulletin contains diagrams and information concerning installation and application.

Circle **Item 99** on Inquiry Card

FINNED TUBE RADIATION—Two catalogs covering residential and heavy duty baseboard radiation and industrial finned tube radiation and enclosures are published by The Rittling Corp., Buffalo, N. Y. Catalog BB-55A gives complete data on five lines of baseboard radiation and includes ratings and dimensions on all of the company's custom, Prefab, and heavy-duty types. The 20-page finned-tube and enclosure catalog No. FT-55 covers fifteen basic heating elements and Series F sloping top, E flat top, Sil-Vector and Sil-N-Wall enclosures.

Circle **Item 100** on Inquiry Card

HEATING AND COOLING CONTROLS—Its 1957 catalogs for heating and air-conditioning controls have been announced by Penn Controls, Inc., Goshen, Ind. Included in both is the company's Rimset thermostat. Shown in the heating catalog is its Series 680 stack control with automatic recycling. Bulletin 1508 is on heating; Bulletin 1487, cooling.

Circle **Item 101** on Inquiry Card

AIR ELIMINATION SYSTEM—A bulletin describing its patented system guaranteed to end air trouble in hot water heating plants is published by Bell & Gossett Co., Morton Grove, Ill. Called the Airtrol system, device is made for all boilers and compression tanks regardless of size. The bulletin shows the system to be a self-operating unit designed to take advantage of the fact that in any hot water heating system the point where the greatest volume of air is released is at the boiler. Air can never be completely eliminated from the heating system, but it can be controlled to prevent the common troubles it causes. How this troublesome air from radiation units is removed and returned to the compression tank where it maintains a proper air cushion is explained in 6 pages of illustrations plus text.

Circle **Item 102** on Inquiry Card

IMPULSE STEAM TRAPS—Yarnall-Waring Co., Philadelphia, Pa., announces Bulletin T-1746 which describes the company's Series 40 impulse steam trap, designed especially to handle heavy condensate loads. The 4-page bulletin describes the operation of the trap, gives sizes and capacities, lists typical applications, and shows dimensions, weights and prices.

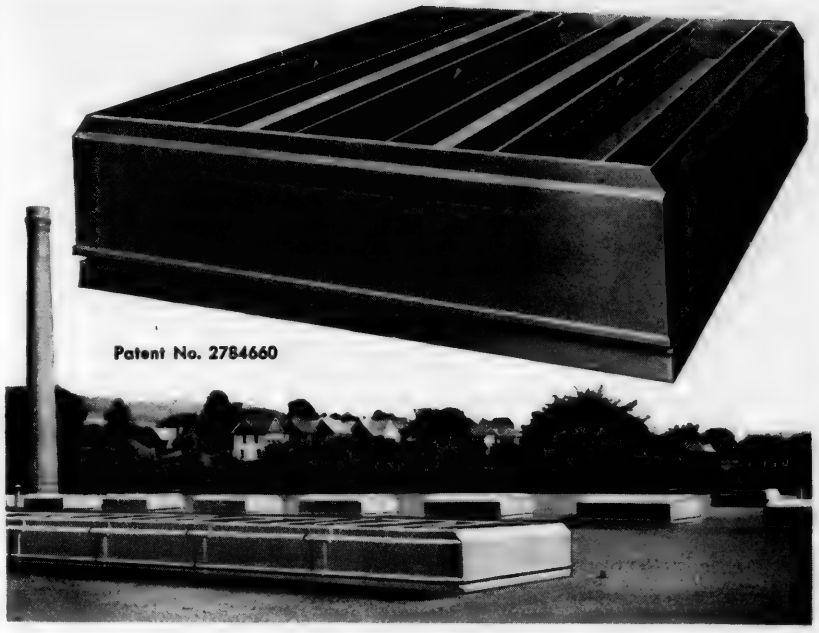
Circle **Item 103** on Inquiry Card

WELDING STEAM PIPING—Developments in welding of steam-power piping are described in Welding Chrome-Moly Alloy-Steel Piping, an 8-page magazine reprint designated F-1055, available from Linde Air Products Co., a Division of Union Carbide and Carbon Corp., New York, N. Y.

Circle **Item 104** on Inquiry Card

(Continued on page 176)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.



Lower Contour, Higher Efficiency in roof ventilators, at Lower Cost with Swartwout's new

Contouramic

Airmover®

Nearly a foot lower than any roof ventilator previously offered, Contouramic Airmover follows the trend to neater roof appearance. But there's no sacrifice of efficiency! In fact, capacity is *increased* — and many other advantages follow:

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And automatic opening of dampers in case of fire is added as a standard feature.

Contouramic Airmover can be used in various ways: for "spot" ventilation over heat-producing operations; for safety ventilation above stages; and in runs or complete roof coverage to achieve large scale ventilation. And it's absolutely weatherproof.

Use this newest concept in roof ventilation on new buildings or for added relief on older ones.

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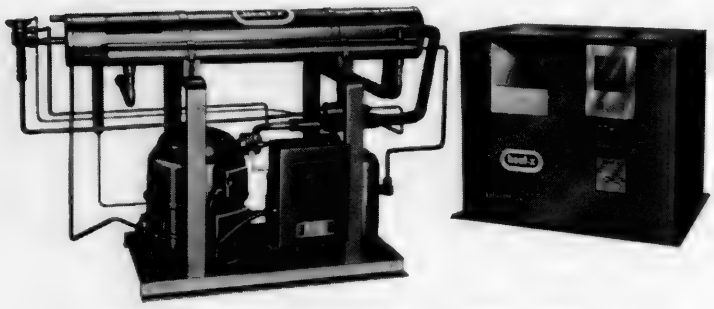

Assure YOUR Profit Share with these NEW heat-x Units

Completely packaged water chillers . . . in 2, 3 and 5 HP models . . . designed for easy, speedy installation that *builds profits.* Available in water-cooled models ('RPC') and air-cooled models ('ARPC'), these new Heat-X units were developed *specifically* for residential and light commercial air conditioning systems.

High efficiency patented Inner-Fin® construction of chillers, superheaters and condensers makes these the most compact units on the market. All water passages are of non-ferrous construction, eliminating corrosion problems.

Don't be left behind in the coming residential air conditioning boom. Write today for complete data on 'RPC' and 'ARPC' units.

HEAT-X, Inc.
A Subsidiary of Dunham-Bush, Inc.
BREWSTER • NEW YORK

NEW CATALOGS

(Concluded from page 175)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

WATER TREATMENT—The treatment of water in air-conditioning systems is discussed in a paper published by Water Service Laboratories, Inc., New York, N. Y., a firm of research and consulting engineers. Subjects covered include hints on corrosion and scale prevention, problems in chilled water circulating systems, refrigerating plants, and control of chemical treatment.

Circle **Item 105** on Inquiry Card

COMBINATION GAS-OIL BURNERS—Combination gas-oil burners for jobs requiring dual fuels are described in Bulletin GO-200-B, available from Mettler Co., Inc., Division of Eclipse Fuel Engineering Co., Los Angeles, Calif. Listed are input capacities, output ratings, and construction details required for the installation of any of the four sizes of company's Fan-Air burners. Four basic models of gas-oil burners are illustrated with capacities ranging up to 400 bph. Additional photographs and line drawings are used to explain both the operating components of these packaged burners and to detail installations.

Circle **Item 106** on Inquiry Card

RADIAL COMPRESSORS—A 2-color, 38-page, illustrated catalog, Form AC-249 contains feature and specification information on 10 to 125 hp radial compressors designed for commercial and industrial air conditioning and refrigeration by Airtemp Div., Chrysler Corp., Dayton, Ohio. Compressor design, components, controls and operation are pictured and explained in detail. Twenty-seven pages are devoted to compressor, condenser and engineering specification data.

Circle **Item 107** on Inquiry Card

SPEED REDUCERS—The use of double-enveloping worm gearing in the company's speed reducers provides more load-carrying capacity, size for size, than possible with other right-angle reducers. Complete details on an improved and extensive line of these speed reducers are presented in Bulletin CD-218, released by Cone-Drive Gears Div., Michigan Tool Co., Detroit, Mich.

Circle **Item 108** on Inquiry Card

REFRIGERATION VALVES—Form W-4-S, Section M, available from The Controls Co. of America, Milwaukee, Wis., manufacturers of A-P controls, introduces many new products and a line of valves made specifically for automotive air conditioning. New capacity ratings and data on improvements in designs of its standard and special type valves, filters, and driers are included.

Circle **Item 109** on Inquiry Card

SINGLE-PHASE MOTORS—Bulletin GEA-6240A, 8 pages, published by General Electric Co., Schenectady, N. Y., illustrates specific advantages of single-phase capacitor motors, 1-3 hp, 115 and 230 volts, 60 cycles, for materials handling, wood- and metal-working equipment, pump and compressor, fan and blower, refrigeration and air conditioning, and farm applications. Dimension data for estimating is given on dripproof, resilient-base, and totally enclosed fan-cooled motors. Rating and type charts offer aid on applications.

Circle **Item 110** on Inquiry Card

GAS HEATING EQUIPMENT—A new, comprehensive catalog, GN-57, covering the company's complete line of gas-fired commercial and industrial heating equipment has been published by the Reznor Manufacturing Co., Mercer, Pa. Equipment shown in the catalog includes suspended gas unit heaters, both fan and blower types; the Flexitemp floor model heater; two series of duct furnaces; and a horizontal furnace. In addition to complete specifications, construction details and large, easy-to-read dimension drawings and tables, the catalog also includes a wealth of installation information and application ideas.

Circle **Item 111** on Inquiry Card

INSTALLATION SUPPLIES—An 8-page, illustrated catalog describing Globe fixtures used in installing plumbing, heating, air conditioning, and sprinkler systems is now available from Hupower Div., Hupp Corporation, Detroit, Mich. Full application and size data are included. Products described include steel inserts to hang overhead piping in concrete, split ring (Clevis) hangers, I-beam clamps and retaining rings, underground hanger clamps, steel ceiling plates and ceiling buttons, adjustable swivel hangers, escutcheon plates for sprinkler heads, and emergency sprinkler cabinets.

Circle **Item 112** on Inquiry Card

SWIMMING POOL DATA BOOK—Modern Swimming Pool Co., Inc., White Plains, N. Y., offers its catalog and data book of swimming pool supplies, chemicals and equipment. It is a 52-page book, profusely illustrated, containing data, photographs, and prices of every item needed to build a new residential or public pool, or to equip and maintain an existing pool. There is a section on pressure filter systems for both private and public pools; charts that enable one to select the proper size filter; and detailed information about the new buried type filters for residential pools where space is limited. There is also a section on proper pool care and maintenance, and detailed descriptions of water-treatment chemicals.

Circle **Item 113** on Inquiry Card

(Continued on page 178)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

1 reliable source for thousands of pumping needs!

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NEW CATALOGS

(Continued from page 177)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

CENTRIFUGAL COLLECTORS—A fully illustrated folder on centrifugal collectors is available from The Kirk & Blum Manufacturing Co., Cincinnati, Ohio. It describes in detail two new-design types, and explains the wide range of industrial applications for each in efficient air cleaning and dust collection through centrifugal force. Complete specifications for the 41 sizes of the company's centrifugal collectors are included, as well as dimensional drawings. Information on collector selection through determination of particle size is presented.

Circle **Item 114** on Inquiry Card

STAINLESS STEEL PIPING—Corrosion-resistant Speedline fittings of stainless steel are described in its 22-page catalog available from Horace T. Potts Co., Philadelphia, Pa. Fittings have added straight section sufficiently long to permit attaching slip-on or insert flanges without fouling. A tube within a tube heat exchanger is described. Included also is general information about soldering, welding, and silver brazing of stainless steel and a table on comparative data on tubing and IPS pipe schedules.

Circle **Item 115** on Inquiry Card

METER-RELAY CONTROLS—Contact meter-relays, versatile instruments that both indicate and control almost any physical or chemical condition that can be detected electrically, are described in a 40-page catalog, No. 4-C, now available from Assembly Products, Inc., Chesterland, Ohio. The catalog supplies complete information for ordering meter-relays intended for use in original equipment or in self-contained control packages. Various circuits for providing different types of control action are discussed.

Circle **Item 116** on Inquiry Card

ROTATING MACHINERY PROTECTION—A device that protects rotating and reciprocating machinery by anticipating any malfunction, is described in a 4-page bulletin, No. 600-1, available from Fielden Instrument Div., Robertshaw-Fulton Controls Co., Philadelphia, Pa. The device, known as Vibraswitch malfunction detector, will automatically shut down protected equipment, or sound an alarm the instant normal operating vibration is exceeded. The bulletin covers in detail different models of the vibration detector, as used in exposed, hazardous and protected locations. Typical applications include the protection of pumps and motors, compressors, generating equipment, fans and blowers, gas and Diesel engines, and turbines.

Circle **Item 117** on Inquiry Card

(Concluded on page 180)

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CENTRIFUGAL
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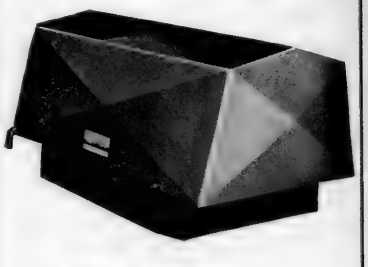

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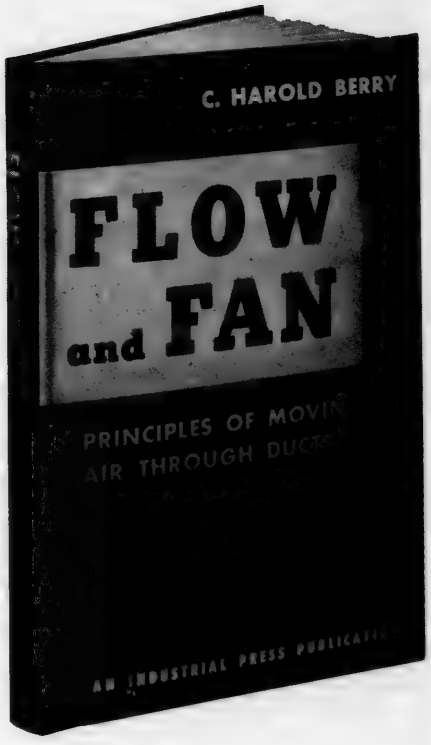

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- Fan Performance
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84 Illustrations

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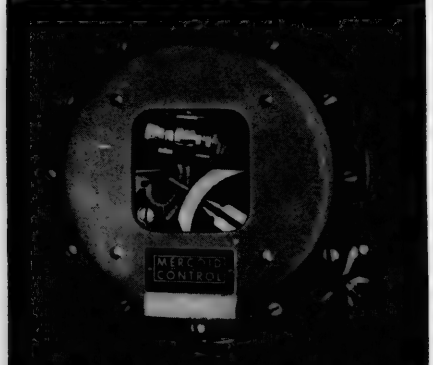

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THE MERCOID CORPORATION
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NEW CATALOGS

(Concluded from page 178)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

FOULING OF COOLING WATER—Betz Laboratories, Inc., Philadelphia, Pa., announces the availability of a technical paper, No. 134, entitled, Biological Fouling in Recirculating Cooling Water Systems. This paper discusses the common problems of slime and algae in these systems and points out how deposits of biological origin can interfere seriously with heat transfer. A discussion of control agents used to overcome this situation and selection of the proper toxicant is also included.

Circle **Item 118** on Inquiry Card

SHEET METAL FORMING — Dreis & Krump Mfg. Co., Chicago, Ill., has issued a 16-page catalog on the advanced design of the Series A, B, C, and L Chicago press brakes. This catalog, AL-57, illustrates and describes the principal construction features and gives complete specifications of the different sizes of brakes in the 30, 36, 50, and 60-ton capacities. Also many special features that can be incorporated are described.

Circle **Item 119** on Inquiry Card

GASKETS AND PACKINGS—A 48-page catalog containing a wealth of information on industrial gaskets, mechanical packings, and boiler gaskets is published by Rhopac, Inc., Skokie, Ill. A special engineering section includes a gasket recommendation chart, material comparative cost graph, gasket fault elimination chart, mechanical formulas and decimal equivalents table.

Circle **Item 120** on Inquiry Card

PIPE MANUFACTURE—Piping fabrication, from the preparation of bids to delivery of the finished job, is described in a 16-page brochure published by Flori Pipe Co., St. Louis, Mo., a subsidiary of Sparton Corporation. The company's equipment, materials, and processes, including pipe-bending facilities, welders, x-ray machines, and heat-treating furnaces are illustrated.

Circle **Item 121** on Inquiry Card

FRICTION LOSS CALCULATOR — A handy pocket slide calculator for figuring water pipe and paper stock pipe friction losses has been developed by Allis-Chalmers Mfg. Co., Milwaukee, Wis. Data for computing water pipe friction loss are based on standards of the Hydraulic Institute and appear on one side of the calculator while those for determining paper stock pipe friction loss are on the other side. The calculator is available when requested on company letterhead.

Cross section shows structural superiority of Aeromaster's new, extruded aluminum-alloy blades in diameters from 9′ to 22′.

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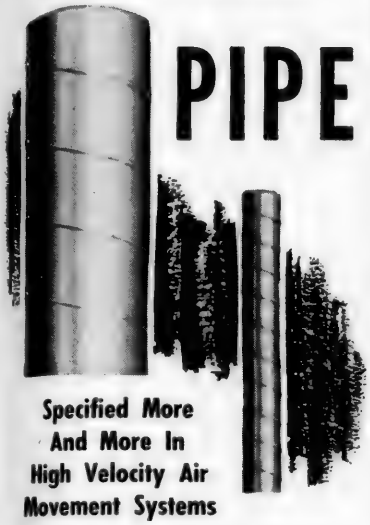

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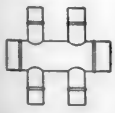

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PRINTED FORMS available for immediate shipment. Heating & oil burner materials form, burner service record cards, service order forms, inspection information form, survey sheet and others. Also can supply **BURNER SERVICE** form in 3 part **EZE-SNAP** with 2 carbons in each set. 1200 sets **IMPRINTED** with your name, address and telephone, only $20.40. Send for samples—no obligation. Write Dept. AC, Degree Day Systems, Woodside 77, N. Y.

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Write, giving your experience and educational background, to Manager of Staff Employment.

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TAKE A *BIGGER Share* OF YOUR AIR CONDITIONING MARKET with

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Shown in Sizes 2 to 7½ Tons Available with Water or Air Condensers

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An unbeatable combination — the "first string" team of valve and union for dependable trouble-free piping installations.

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★ Renewable Composition Disc

Perfect sealing at all times—

A disc for every type of service—

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—Rigid alignment of all parts—guaranteed perfect seating all the time.

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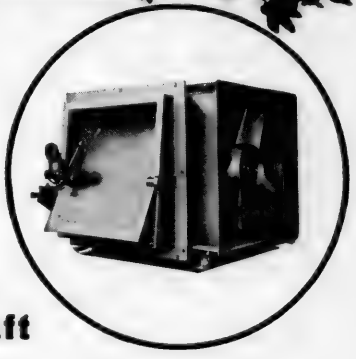
- rusting
- maintenance
- worry about wind or storm
- poor combustion from variable draft
- unsightliness



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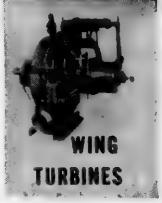

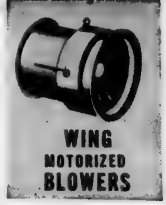

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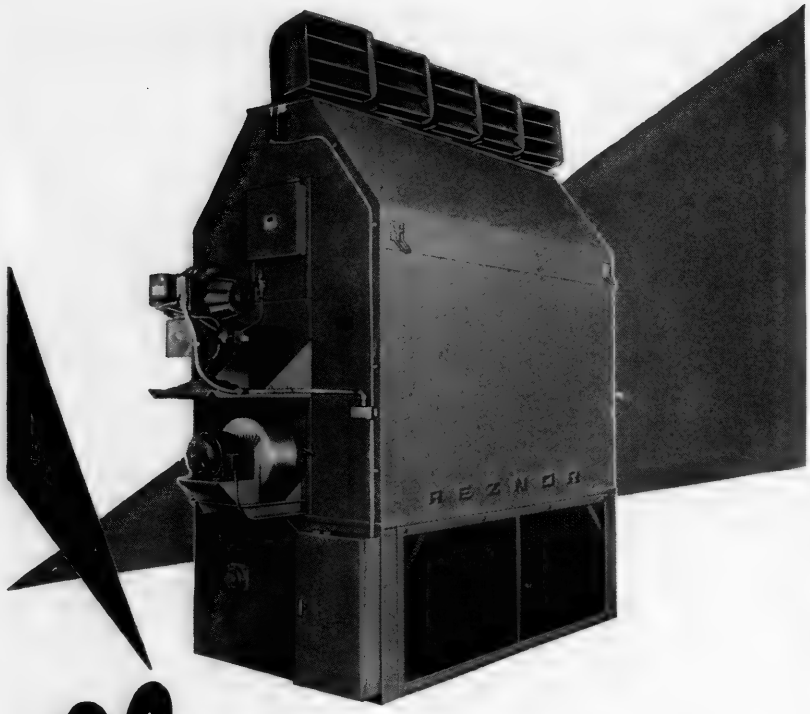

Olson Stainless Steel Direct-Fired Heaters

Now a part of the Reznor line

Reznor, the leader in gas unit heating, has taken over the manufacture of Olson stainless steel direct-fired heaters. They will now be marketed as Reznor-Olson heaters. These units, formerly made by Arthur A. Olson & Company of Canfield, Ohio, have been widely recognized for their superior engineering.

Continuity of engineering has been assured by the addition of key personnel from the Olson organization to the Reznor staff. Further development and improvement of the line will be continued with Reznor research and engineering facilities under the direction of Olson men who pioneered this type of equipment. Production of the heaters will be integrated into the Reznor manufacturing operation. This will mean better delivery schedules. And the extensive Reznor field organization will mean improved availability of product information and engineering assistance when you need it.

If you're not familiar with Olson equipment, write today for free descriptive bulletin.

REZNOR
WORLD'S LARGEST-SELLING DIRECT-FIRED UNIT HEATERS

Reznor Manufacturing Company, Dept. A, Mercer, Pa.

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The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement. NOTE: All advertisements are digested here except those received too late for inclusion. The Index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well as Ad-Digest items.

HIGH EFFICIENCY STEAM TRAPS
These traps won't leak, they vent air as fast as it accumulates, discharge at steam temperatures, are suitable for any return system, are rough and ready, readily available, and guaranteed, as 44-page steam trap book illustrates.
Inside Front Cover — Item 200

BOOK ON NOISE CONTROL
Helpful 50-page book, "Controlling Ventilation Noises," is available from this company for two dollars, prepaid, to help defray costs of printing and handling. With it anyone can predict and reduce ventilating fan noise in every installation. Request on letterhead.
Page 1 — Item 201

DATA FILE ON STORAGE HEATERS
Containing all basic data on company's copperlined storage water heaters, file contains complete specification outline, construction details, heating capacities, engineering and installation data, and many other needed facts.
Page 5 — Item 202

BENDING WROUGHT IRON PIPE
Wrought iron's ductility permits speedy bending and stretching without rupturing the metal. Technical bulletin, "The Bending and Flanging of Wrought Iron Pipe," is available.
Page 9 — Item 203

NEW PRESSURE RELIEF VALVES
Two series of ASME-rated safety relief valves are offered. No. 74A-74O features expanded outlets with large internal flow areas especially designed and rated for hot water space heating boilers. Series 174A are for all hot water and supply boilers. Bulletin available.
Page 11 — Item 204

HERMETIC CONDENSING UNITS
With no belt, seals, or manual oiling, 90% of service costs are eliminated on these compressor units which are available in air cooled models from 1/3 to 5 hp and in water-cooled models from 1/3 to 10 hp. Information available.
Page 13 — Item 205

AIR-CONDITIONING MOTORPUMPS
By standardizing on this company's motorpumps you offer your customers pumps designed specifically for air conditioning systems. Thousands are in trouble-free operation today. Literature reviews ¼ to 75-hp line.
Page 15 — Item 206

AIR CONDITIONING SYSTEMS
Unlimited freedom of system choice and equipment application regardless of size, location, or type of building is offered by this company. Illustrated is hermetic compressor, evaporative condenser, packaged chiller, water-cooled condenser, and packaged unit. Information available.
Page 16 — Item 207

AIR-COOLED CONDENSER
Company's air-cooled condenser plus year-round automatic head pressure control guarantees maximum pressure at expansion valve in winter, maximum summer capacity, prompt defrosting, immediate compressor start-up. Bulletin available.
Page 18 — Item 208

PROPELLER FANS STAY COOL
Ventilating fans from 6 to 72 inches are available with direct-connected motor with permanently lubricated ball bearings. They run and stay cool, are quiet, smooth, and free-running. PFMA certified air capacity ratings. Information available.
Page 19 — Item 209

ROOF VENTILATORS
Two in company's line of room ventilators are illustrated. Simplified design reduces obstruction to air flow for higher efficiency, lowered initial cost, and guaranteed minimum maintenance. Bulletin available.
Page 20 — Item 210

COPPER-BRASS TUBE, BRASS PIPE
Manufacturer of copper and brass pipe and tube promises that when its product is specified, the right quantity in the right sizes are delivered on time, with the result that contractors' work is unhindered. Information available.
Page 21 — Item 211

MULTI-ZONE AIR CONDITIONER
Unit illustrated supplies any desired combination of heating, cooling, or ventilating to as many as 25 zones. It may also be used as a heating and ventilating unit only. Use of reheat coils and their controls in the individual zone ducts are eliminated. Information available.
Page 22-23 — Item 212

STEEL PIPE FOR WATER SUPPLY
Uniform ductility, length, threading, weldability, wall thickness and size, strength and toughness, and roundness and straightness makes this pipe the best obtainable. Information available.
Page 24 — Item 213

HEAVY-DUTY BRONZE VALVES
Broad selection of heavy-duty bronze valves are produced to the same high standards as company's older domestic plumbing and heating valves. Condensed catalog and comparable valve chart is available.
Page 25 — Item 214

HIGH VELOCITY SYSTEMS
Installation of company's all-air high velocity ducts and diffusers solves the problem of flexibility in the Medical Towers Building, Houston, Texas. Illustrations show building under construction and drawings of typical suite. Selection manual available.
Pages 26-27 — Item 215

DRAFT CONTROL
Accurate units for coal and oil-fired heating plants are heavy-duty, commercial models in 28- and 32-in. sizes. They are also available in 6- to 24-in. sizes for domestic and commercial installations. Controls for gas and gas-oil fired heating plants are in sizes 8- through 32-in.
Page 28 — Item 216

TAILOR-MADE ELECTRIC MOTORS
Electric motors are custom engineered at standard motor prices for the product they are designed to power. It is no longer necessary to design a product around a standard motor. Information available.
Page 29 — Item 217

EASY-TO-INSTALL AXIAL FANS
Company's axial fans save space and lower installation cost by providing straight-line air flow, eliminating elbows, bends, and transformation pieces. Capacities range from 2,500 to 75,000 cfm with larger sizes available on special order. Information available.
Page 30 — Item 218

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information.

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PLEASE PRINT June H-57

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Name .....

Firm .....

Nature of Firm's Business .....

Street .....

City .....**Zone** ....**State** .....

This card is void after Sept. 1, 1957

Ad-Digest

ZINC-COATED STEEL SHEETS
Illustration in ad shows heavy tractor having gone over this company's zinc-coated steel sheets without ruining its coat. Sheet is highly resistant to corrosion, heat, and noise. Booklet available.
Page 31 Item 219

REDUCED VOLTAGE STARTERS
High starting current inrush, the cause of lamp flicker, can be brought down to power company's limitations with one of six types of starters illustrated. Sales engineers will help you decide. Information available.
Page 32 Item 220

WELDING FITTINGS AND FLANGES
Line includes 12,000 standard welding fittings and flanges, plus thousands of specials such as A-power fittings illustrated. Nearby distributor provides complete-line service. Booklet available gives data on pipe, fitting, and flange materials.
Insert bet. 32-33 Item 221

STEAM SPECIALTIES
Chris-Craft's Holland, Mich., plant insisted that no part of building structure or its utilities should extend below bottom flange of ceiling beams. No problem for company's steam traps, as illustrated: Their design permitted in-line piping to unit heaters. Bulletin available.
Page 33 Item 222

UNITS CHANGE THEIR OWN FILTERS
Air conditioning units, industrial unit heaters, and heating and ventilating units all incorporate in them an automatic filtering system that holds a year's supply of filtering material and changes, as needed, automatically. Bulletin explains.
Pages 34-35 Item 223

AUTOMATIC AIR FILTERS
Company's filters have no equal because the media used is unique. The fluffy white blanket of bonded glass fibers is the result of dozens of research projects. Bulletin available.
Page 40 Item 224

LINE OF HEAT EXCHANGERS
Company builds a complete line of heat exchangers, detailed in advertisement, for industrial and process applications. High temperature hot water equipment is also shown. Full page devoted to listing representatives throughout this country, Canada, Mexico. Information available.
Insert bet. 40-41 & Page 41 Item 225

ROLL-TYPE FILTER
This roll-type automatic filter combines fully automatic operation and high efficiency with large dirt-holding capacity and minimum maintenance. Catalog available.
Page 42 Item 226

AUTOMATIC CONTROL SYSTEM
Air conditioning throughout ten acres of America's most modern newspaper plant will be regulated by this company's automatic temperature and humidity control system. Inquiries on its quality system invited.
Page 43 Item 227

EASY-ACCESS AUTOMATIC BOILER
Low maintenance and easy access are prime features of this company's line of automatic boilers. All doors and burner are hinged. Design eliminates refractory baffles or partitions which might burn out, leak, or cause short-circuit of gases. Bulletin available.
Page 44 Item 228

ONE-PIECE PIPE INSULATION
Insulation of high-velocity round ducts with this glass fiber insulation involves merely the spreading of the seam of the 3-ft section and snapping on. The work is rapid, the finished job neat. Diameter to 33 inches with vapor barrier adhered. Information available.
Page 45 Item 229

CONVECTOR RADIATION
Experienced heating engineers and contractors are making this company's convector radiation their prime source. Thirty types in 8,000 sizes for every floor, wall. Recessed and concealed installation have standard or heavy-gage enclosures. Catalog available.
Page 46 Item 230

FANS FOR HIGH PRESSURE WORK
Company's fans are designed for maximum efficiency, quiet operation, service-free performance, adaptability to various inlet control, and ease of installation. They are ideal for high-pressure air moving applications. Bulletin available.
Page 47 Item 231

STANDARD, SPECIAL PIPE JOINTS
Advertisement illustrates and explains the application of Gimbal expansion joint and hinge expansion joint in 8 in. pipeline at Allied Chemical and Die Corp. plant. Information available.
Page 48 Item 232

COMMERCIAL PACKAGED UNIT
Pre-engineered unit is a complete air conditioning system housed in one cabinet, entirely self-contained with evaporator, compressor, evaporative condenser and pump, fans, motors, piping, and controls. Engineered to provide peak operating performance at minimum operating cost. Available in 10, 15, 20, 30 and 40-ton models. Catalog available.
Page 49 Item 233

MODERN HOTEL AIR CONDITIONING
Company's air conditioning system, according to Sheraton-Cadillac Hotel engineers, has been able to affect savings in both installation and operation. Schedule of installations shown. Information available.
Page 50 Item 234

HOT WATER STORAGE HEATERS
At Virginia's Jamestown Festival more than two million visitors will walk back through 350 years but only a few steps from the comforts provided by cement-lined hot water storage heater for reception center, gift shops, restrooms, and taverns. Catalogs available.
Page 51 Item 235

HI-TEMP WATER FOR HEATING
Illustrated is Cross Co.'s, Fraser, Mich., plant where high temperature hot water system was recently completed using this company controlled circulating hot water boilers. Company's plant engineer attests to its low fuel and maintenance costs. Catalog available.
Page 52 Item 236

VENTURI-FLO DISTRIBUTOR
Equal distribution in any position with this company's one-piece distributor is promised. There is low pressure drop. Application ranges from 25 to 150% of rated capacity. Bulletin available.
Page 53 Item 237

NEW COMBINATION GAS VALVE
Combination gas valve for central heating units is different, a new concept in gas valve design. Good for all gases, safe lighting, it is available for 100% shut-off in capacities up to 300,000 Btu per hr. Information available.
Page 54 Item 238

FIRE-TESTED STEAM GENERATORS
Fully integrated units include boiler, burner, and controls with all inter-connecting piping and wiring completed at the factory, ready to go to work as soon as tied in to steam, water, fuel and electric lines. Bulletin is available.
Page 55 Item 239

MULTI-ZONE AIR CONDITIONERS
At Baltimore's unique 60-store shopping center, air conditioning of each store with its own temperature requirement in half of the amount of space usually allocated to an air conditioning system was accomplished with this company's multizone air conditioning units. Information available.
Page 56 Item 240

UNFIRED PRESSURE VESSELS
Company's patented lining for its unfired pressure vessels and storage tanks results in products able to solve the corrosion problems of most known fluids or chemicals. This means the longest life at the lowest possible price. Information available.
Page 57 Item 241

MOTORS FOR AIR CONDITIONING
The silence of these motors for air conditioning systems is golden. It's vital for motels, hospitals and other institutions where quiet comfort is a must. Bulletin is available.
Page 58 Item 242

REFRIGERANTS 11, 12, 22, 113, 114A
Selected physical data are presented for company's line of refrigerants for every need. Product is dry, pure, and consistently surpasses manufacturing specifications. Bulletin available.
Page 59 Item 243

VIBRATIONLESS BLOWERS
Blowers are not off-the-shelf units but are built to customer rotation and discharge specifications. Each one receives 100% inspection before it leaves the factory. NAFM and NEMA standards throughout. Bulletin available.
Page 60 Item 244

BALL BEARINGS FOR FANS
An economical and efficient improvement for air-conditioning equipment is this company's ball bearing pillow block. It has been adopted as standard equipment by several manufacturers. Bulletin lists dimensions, load ratings.
Page 61 Item 245

UNDERGROUND CONDUIT SYSTEM
New ceramic pipe support blocks eliminate the need for interior cast iron rests. Perforated block is laid as a structural support member at regular intervals and bars are inserted and locked in place. Circular available, has complete installation specifications.
Page 62 Item 246

BOILER WATER LEVEL CONTROLS
One thing than can be done to insure the safety of our school children is to see that the boiler water line is under the endless vigil of good quality level controls. Shown are boiler water feeder and low water cut-off combination, pressure relief valve, and pump control cut-off and alarm switch. Information available.
Page 63 Item 247

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U. S.

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING
93 WORTH STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

Ad-Digest

VALVES PROVEN ON STEAM SERVICE
Illustrated is 175-lb steel gate valve which has been in operation for 34 years on 80 psi steam service. Of 40 such valves in installation only one had to be replaced. Bulletin cites case histories.
Page 64 Item 248

P-TYPE ROOF FANS
These units are presented as answer to today's needs for low velocity roof ventilation on public and commercial buildings, especially one-story, flat-roof modern structures. Galvanized steel or aluminum fabrication available. Automatic dampers optional.
Page 65 Item 249

TEMPERATURE REGULATORS
Advantages of packless construction in temperature regulating valves include the elimination of repacking problems, lower maintenance, and accuracy of regulation. This company's units are guaranteed not to wiredraw. A bulletin with piping layouts is available.
Page 66 Item 250

NON-FREEZE HEAT TRANSFER
Inherent protective features of company's heating and cooling surfaces guarantee against freeze-ups, the biggest headache in heating and air conditioning. Two bulletins detail company's exclusive heating surface and water surface.
Page 67 Item 251

LEAKPROOF PACKLESS VALVE
Company's valves are packless in the full meaning of the word, in that stainless steel wafers press on machined collar to produce a permanently leak-proof seal. Can be relied on for any service to 100 lb. Information available.
Page 68 Item 252

AIR COOLED CONDENSER
Now you can buy an air cooled condenser with lifetime high capacity, company's engineers say. Their turbo-flow finned coils won't clog. Condenser bulletin available.
Page 69 Item 253

HEAVY DUTY OIL BURNERS
Company's cast iron boilers were built specifically to fully develop the economies possible with rotary burners using heavy low-cost oils. Bulletin contains complete engineering data.
Page 70 Item 254

HOT-WATER DEAERATOR SYSTEM
Company's air removal systems are guaranteed to prevent accumulation of air in heating units and prevent noises caused by entrained air in piping. In case of failure, company's engineers will provide free services of factory trained engineer to supervise changes required. Bulletin available.
Page 71 Item 255

ELECTRIC CONTROLS IN SCHOOLS
Company's exclusive electric control systems reduce initial costs substantially and assure more stable classroom temperature and fresh air supply. Booklet on electric control, especially written and illustrated for school officials, is available.
Page 123 Item 256

LINE OF CONDENSATE PUMPS
Manufacturer's complete line of pumps features compact, modern design with ready accessibility for inspection. They are built to every installation requirement, in single and duplex units. Brochures are available.
Page 125 Item 257

DURABLE GALVANIZED SHEETS
Illustrated is Supreme Court building in Brooklyn, N. Y., which is using more than 365 tons of air conditioning, heating and ventilating ducts made of this company's durable, easy-working galvanized sheets. Information is available.
Page 127 Item 258

REFRIGERANT LEVEL CONTROL
Company's standard thermostatic expansion valve with matched elements make the perfect combination for positive liquid level control for ammonia and Refrigerant-12 up to 100 tons, Refrigerant-22, up to 180 tons. For all flooded systems. Bulletin available.
Page 129 Item 259

SEMI-STEEL OR BRASS STRAINERS
Three series of strainers are illustrated and data on each presented. Strainers can be used for steam, water, oil, air, or gas service. Information available.
Page 130 Item 260

VALVES PROTECTED 18 WAYS
Diagram shows stronger spindle, heavier bonnet, back seating to protect threads, chromium stainless-steel plug and seat ring, and extra-heavy bronze body, five ways in which company's plug type valves are engineered for maximum wear. Descriptive folder available.
Page 133 Item 261

SUBMERSIBLE PUMPS
Hundreds of applications are possible because of pump's large capacity, compactness, low center of gravity, portability, and submersible features. Among them are: basement sump pump, coolant circulation, in septic tanks. Up to 5000 gph.
Page 135 Item 262

GAS-FIRED UNIT HEATERS
Company's unit heaters and duct furnaces offer special long lasting value with all-welded heat exchanger made of 16-gage aluminized steel. Other advantages are smart design, wide choice of sizes. Information available.
Page 135 Item 263

FORCED DRAFT COOLING TOWER
An efficient tower that combines the simplicity of natural draft towers with all the efficiency of a forced draft tower is available from this manufacturer to match air conditioners from 3 to 25 tons. Information is available.
Page 136 Item 264

WARM AIR FURNACES
Four series of furnaces are illustrated: heavy-duty models for industrial, and commercial heating, gas-fired suspended types, oil-fired suspended types, and a direct-fired series, the last in capacities to 2,000,000 Btu.
Page 136 Item 265

BOILER SAVES $12000 EACH YEAR
Boiler installed in Immaculata College boiler modernization saves an estimated $12,000 each year, testifies consulting engineer. Conversion to oil and increased boiler efficiency reduced fuel approximately 50%. Information available.
Page 139 Item 266

WORKABLE GALVANIZED SHEET
Company's continuous galvanizing process is of the latest design and includes a continuous annealing process which gives the sheet the right blending of strength and ductility. Sheet may be ordered in cut lengths or coils, 13-gage and lighter, in plain or copper-bearing steel.
Page 141 Item 267

GLASS FIBER AIR FILTERS
Disposable filters, replaced regularly, solved two vexing problems at newspaper printing plant. Ink mist and paper dust no longer foul press unit drive motors through their intakes, nor does ink condense in air ducts. Information available.
Page 143 Item 268

ELECTRIC MOTORS
Designed specifically for quiet operation, their use in air conditioning applications is recommended in hospitals, hotels and office buildings where silence is a prime specification.
Page 145 Item 269

HEATING AND COOLING UNITS
Every room is a separate heating zone with its own thermostat. Modulation from slow idling speed to full capacity is provided. Ideal for any type of building or home, new or old. Individual unit cooling makes the perfect two-some for year-round comfort. Literature available.
Page 147 Item 270

YEAR-ROUND AIR CONDITIONING
Woodlane apartments, comprising 18 buildings and covering 4 city blocks were air conditioned with this company's equipment. Dallas, Texas, apartments are illustrated. Four compressors furnish 400 tons refrigeration. Information available.
Page 151 Item 271

REGISTERS & GRILLES
Five items are illustrated, including wall and baseboard registers, ceiling diffusers, perimeter floor and baseboard diffusers. Easy to install, they are for residential, commercial, and industrial applications, as described in complete line catalog available.
Page 155 Item 272

PRE-ENGINEERED SOUND TRAPS
Sound traps are made by this company to silence air conditioning noise of all frequencies in the audio-frequency range. A 7-ft unit suppresses as much sound as 100 ft of ordinary duct lining. Four series cover applications ranging from offices to recording studios. Booklet is available.
Page 157 Item 273

HEAVY-OIL BURNER
Company offers a simple and practical and, hence, dependable burner for residual oils which are low-cost fuels having higher heat value than light oils. Heavy oils Nos. 5 and 6 are easily controlled and burned by system which is remarkably free from mechanical complexities. Catalog available.
Page 159 Item 274

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Street .....

City .....**Zone** ....**State** .....

This card is void after Sept. 1, 1957

Ad-Digest

PUMPS FOR WORRY-PROOF SERVICE
Items illustrated include horizontally splitcase pump with capacities up to 1900 gpm; close-coupled pump with capacities up to 500 gpm, and pedestal-mounted flexible-coupled pump. Each is described in a separate bulletin.
Page 161 Item 275

WATER COOLERS IN THREE LINES
Five-year guarantee is offered on company's unit. You get a new cooler if failure occurs in the hermetic refrigeration system or cooling tank. Company pays freight both ways. Three distinctive lines offered. Bulletin available.
Page 162 Item 276

FANS FOR HARD VENTILATING JOBS
Where large volumes of air must be moved at variable pressures and volumes against unpredictable resistance, and space allotment is limited, you are urged to investigate company's 136 standard fans whose motors are placed inside for extra performance per lb. Bulletin available.
Page 163 Item 277

INDICATORS AND GAGES
Manufacturer features instruments for liquid depth measurement and remote indication of specific gravity. Two bulletins are available.
Page 164 Item 278

SCHOOLROOM FORCED-AIR HEATING
Gas-fired forced-air schoolroom heating and ventilating system is quality engineered after years of study in school heating and ventilating requirements. Outside air only is used for combustion. Overhead heater is installed in school corridor and modern stores. Literature, specifications available.
Page 165 Item 279

SECTIONAL CONDENSERS
Bulletin explains how pre-cooling removes superheat and gas condenses at lower temperature; how system is automatically purged of oil; how you save 95% of cooling water cost.
Page 166 Item 280

ROOF-COOLING SPRAY NOZZLES
Nozzles for evaporative roof cooling reduce indoor temperatures on hot sunny days 10 to 20 deg. Choice of nozzles includes non-clogging and water-saving models. Bulletin on roof cooling available.
Page 167 Item 281

AIR VOLUME GAGE
For peak residential air conditioner efficiency you may match static pressure drop across system's evaporator exactly to manufacturer's ratings in hundredths of an inch water column with this company's gage. Fits into 8 x 7-inch plastic pouch. Bulletin available.
Page 167 Item 282

BACKWATER VALVES
Basement flooding can be ended with this company's backwater valves. Manually operated spade valve and automatic swing valve are features. Catalog available.
Page 167 Item 283

RADIANT-ACOUSTICAL CEILING
Economy is now possible with this integrated radiant acoustical ceiling. All radiant duct, aluminum acoustical panels, diffuser panels and framing for recessed fixtures are supplied. Booklet available.
Page 168 Item 284

AIR COOLING COILS
Complete line of coils in 2- to 15-ton capacities with multi-outlet expansion valves are ready to install. Four-row coils for residential jobs; six-row coils for commercial jobs. Information available.
Page 169 Item 285

PLASTIC LEAD SEAL
One compound serves for many services: water, oil, gas, steam, chemicals, and petroleum products, low and high pressures. One application lasts forever; never hardens. Free sample available.
Page 169 Item 286

STAINLESS STEEL FLOATS
The inherent strength of stainless steel makes them ideal for liquid level control operating under high pressure or high temperature. Catalog is available with technical float data.
Page 169 Item 287

ALL-ALUMINUM VENTILATORS
Direct drive and belt driven ventilators of all-aluminum construction are offered. Low silhouette design in both. Light starting torque increases bearing motor life. Catalog available.
Page 169 Item 288

DIFFUSERS WITH DIFFUSING VANES
Square and rectangular air diffusers are equipped with built-in diffusing vanes arranged in unlimited louver patterns. A catalog showing how to select the proper size and pattern is offered.
Page 170 Item 289

BURNERS FOR RESIDUAL OILS
Horizontal rotary burners in capacities from 7½ to 175 gph are designed and equipped to represent the lowest installed cost for this type of equipment. Also offered are companion automatic burner equipment. Information available.
Page 172 Item 290

SECTIONAL DUCT FURNACE
Units provide flexibility by eliminating restrictions of packaged heating equipment which isn't exactly right for any one job. System capacities of 2 million Btu per hr are available from furnaces whose duct sections weigh 315 lb.
Page 173 Item 291

DUAL PURPOSE CONDENSATE PUMP
In summer, pump disposes of the condensate resulting from moisture removed from the air by the air conditioner. In the winter, the pump returns the steam condensate to the heating plant. Bulletin includes all data.
Page 174 Item 292

LOW CONTOUR ROOF VENTILATORS
Though nearly a foot lower than roof ventilators previously offered, capacity is increased. Dampers automatically open in case of fire. Absolutely weatherproof. Bulletin available.
Page 175 Item 293

PACKAGED WATER CHILLERS
Units in 2, 3 and 5-hp models designed for quick, profitable installations. Both water-cooled and air-cooled units were developed specifically for residential and light commercial air conditioning systems.
Page 176 Item 294

CATALOG ON INDUSTRIAL PUMPS
One reliable source for thousands of pumping needs: This company offers its catalog, an up to date working tool for useful information on a wide variety of standardized pumps for a multitude of applications.
Page 177 Item 295

FLEXIBLE EXHAUST HOSE
Made of strong Neoprene coated cotton or nylon fabrics spiral wire reinforced, hose is installed for dust control, particularly by elbows and moving hoods. Information available.
Page 178 Item 296

CENTRIFUGAL ROOF EXHAUSTERS
This company's Lo-Boy centrifugal roof exhausters enhance the beauty of building skylines. Forward or backward curve wheel within or out of scroll housing. Bulletin available.
Page 178 Item 297

FANS WITH ALUMINUM BLADES
Extruded aluminum blades combine in one design the advantages of a light weight metal, a hollow structure, and the superior strength of wrought metal. Easily assembled in the tower, fan requires no special handling equipment.
Page 180 Item 298

MERCURY SWITCHES
Company's weather resistant mercury switches have calibrated dial, operating point indicators and hermetically sealed contacts for pressure or temperature regulation. Catalog is available.
Page 180 Item 299

SELF-CONTAINED CONDITIONERS
Model illustrated has 7½ ton capacity, requires only water and power connections. For commercial and larger home air conditioning. Direct air discharge and intake eliminates need for ducts. Line starts with ¾ tons. Data available.
Page 181 Item 300

VALVES AND UNIONS
Bronze globe valve illustrated has renewable composition disc for perfect sealing at all times. There's a disc for every type of service. Union, illustrated, has ground ball joint having extra wide seating surface with two non-corroding seats, practically unbreakable iron body. Information available.
Page 182 Item 301

STAINLESS STEEL HEATERS
Company has taken over the manufacture of a well known line of stainless steel direct-fired heaters. A descriptive bulletin describes the entire new line.
Page 184 Item 302

AIR HANDLING, CONDITIONING
Listed are 100 of America's largest industrial corporations, all users of this company's air handling and conditioning equipment. Information available.
Inside Back Cover Item 303

PNEUMATIC CONTROL, ANY SIZE JOB
You can count on this company's unmatched engineering and installation service on your small installations as well as on your big jobs. Information available.
Back Cover Item 304

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U. S.

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING
93 WORTH STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

ALL 100

General Motors • (E.I.) de Nemo • Goodyear Tire • Firestone Tire • Aircraft • B • American Can • Aircraft • C • Corp. • You • Chemical • Caterpillar Trac • Tide Water As • Crown Zellerba • Illinois Glass

• W • Oil • Oil • • Pit • Aviati • Chem • Scot

• General E • Republ • America • A • Be • Atlanti • Phelps • & Standard

Armour • Du Pont • Westinghouse Electric • Douglas • Goodrich (B.F.) • Lockheed • National Steel • Olin Mathieson • Continental Oil • Studebaker-Packard • Grace (W.R.) • Philco • Owens- • Pillsbury Mills

of America's 100 largest industrial corporations are users of Clarage air handling and conditioning equipment.

CLARAGE FAN COMPANY
KALAMAZOO • MICHIGAN

Source: The Fortune Directory • Published July 1956

Smart Idea, Your Using
Johnson Pneumatic Temperature Contr
in Your Size Building!

Right! Johnson Pneumat
Does Big Things
for Large and Small Buildin
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